



*Personal Computer  
Hardware Reference  
Library*

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# IBM RT PC 6151 System Unit Hardware Maintenance and Service







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6151 System Unit  
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and Service**

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## **Second Edition September 1986**

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## Federal Communications Commission (FCC) Radio Frequency Interference Statement

**Warning:** This equipment has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

This equipment generates, uses, and can radiate radio frequency energy. If not installed and used according to the instruction manual, the equipment may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

If this equipment causes interference to radio communications, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the equipment with respect to the receiver.
- Move the equipment away from the receiver.
- Plug the computer into a different outlet, so that the computer and receiver are on different branch circuits.
- Ensure that card mounting screws, attachment connector screws, and ground wires are tightly secured.



- 
- Ensure that card slot covers are in place when no card is installed.
  - If peripherals not offered by IBM are used with this equipment, it is suggested to use shielded, grounded cables with in-line filters, if necessary.

If necessary, consult your dealer service representative for additional suggestions.

The manufacturer is not responsible for any radio or television interference caused by unauthorized modifications to this equipment. It is the responsibility of the user to correct such interference.

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## Safety

This manual contains "DANGER" notices on pages 4-24 and 4-25. If desired, translate the text and write your own words on the pages.

This manual contains a "Safety Inspection Guide" on the following pages. The Safety Inspection Guide is used by the IBM Service Representative.

The IBM 6151 System Unit contains no hazardous voltages or safety grounds outside the power supply. The power supply is a sealed unit and is not field serviceable.

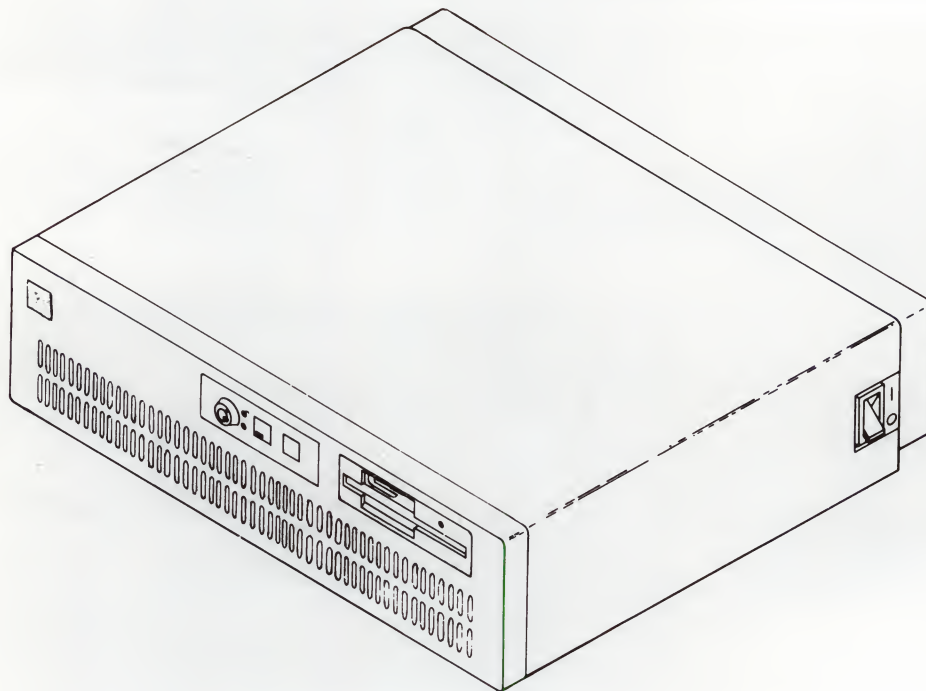
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## Safety Inspection Guide

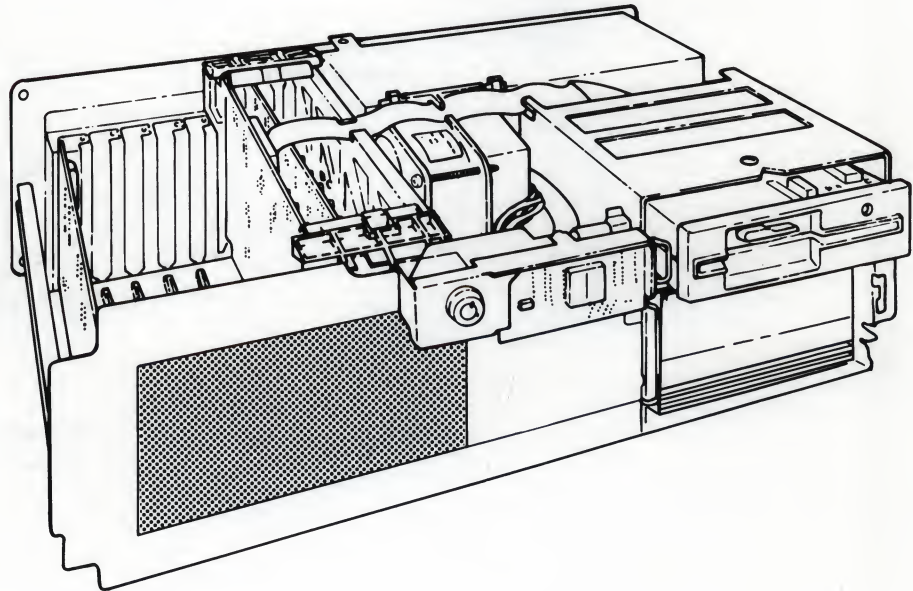
Use this guide to identify unsafe conditions. Use good judgment to identify potential safety hazards not covered by this guide. If unsafe conditions are present, determine how serious the hazards are and whether you should continue before correcting the problem.

Do the following checks:

1. Check the covers for damage or alterations that expose the internal parts of the system unit or for sharp edges.
  2. Check the covers for proper fit to the system unit. They should be in place and secure.
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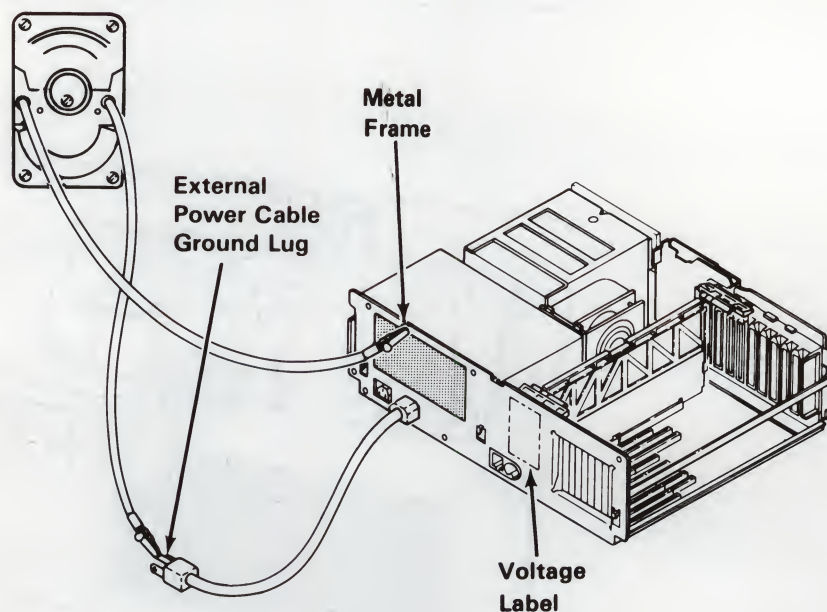


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3. Set the power switch on the system unit to Off.
  4. Do the "Rear Cover Removal" on page 4-10.
  5. Do the "Top Cover Removal" on page 4-12.
  6. Check for alterations or attachments. If there are any, check for obvious safety hazards such as broken wires, sharp edges, or broken insulation.
  7. Check the internal cables for damage.
  8. Check for dirt, water, and any other contamination within the system unit.
- 





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9. Check the voltage label on the rear of the system unit to ensure it matches the voltage at your outlet.
  10. Check the external power cable for damage.
  11. With the external power cable connected to the system unit, check for less than 0.1 ohm resistance between the ground lug on the external power cable plug and the metal frame.
  12. Do the "Top Cover Replacement" on page 4-13.
  13. Do the "Rear Cover Replacement" on page 4-11.
- 



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## About this Book

This manual provides service information about the IBM 6151 System Unit, adapters, and attached devices that do not have their own service information. This manual does not contain service information about attached printing and plotting devices.

Users of this manual should have training on the IBM 6151 System Unit.

This manual is divided into sections to make the information easier to find. A three or four-digit code is used in the page numbering of some sections to make future updating easier.

Section 1, "System Description" contains a brief description of the system unit, keyboard, and display.

Section 2, "Diagnostics" contains descriptions of the diagnostic programs, utilities, and the service request number.

Section 3, "Problem Isolation Charts" contains the service procedures used to isolate failures to a field-replaceable unit.

Section 4, "Removal and Replacement Procedures" contains the locations, removal procedures, and replacement procedures. These procedures may direct you to another section for specific details such as switch settings, jumper settings, or terminator resistor settings.

Section 5, "Base System Unit" contains a description, specifications, cabling diagrams, a data flow diagram, and parts information for the base components of the system unit.

Section 6, "System Memory Options" contains a description, specifications, and parts information for each system memory option.

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Section 7, "Diskette Drive" contains a description, specifications, terminator resistor setting, and parts information for the diskette drive.

Section 8, "Fixed-Disk Drives" contains a description, specifications, terminator resistor settings, and parts information for the fixed-disk drives.

Section 9, "Adapters" contains a description, specifications, switch or jumper settings, and parts information for each adapter used in the system unit.

Section 10, "User Input Devices" contains a description, specifications, a removal procedure, a replacement procedure, and parts information for each type device used to input data or commands.

Section 11, "Displays" contains a description, specifications, control adjustment procedures, and parts information for each IBM display used with the IBM 6151 System Unit.

Section 12, "Tape Drive" contains a description, specifications, and parts information for the tape drive used with the IBM 6151 System Unit.

Appendix A, "Tool Requirements" contains descriptions of the tools needed to service the IBM 6151 System Unit.

Appendix B, "SRA to FRU Cross-Reference List" contains a list of each Service Repair Action (SRA) number and the part number and part name of the field-replaceable unit it represents. This list is in SRA number order.

Appendix C, "Error Log Information" provides an overview of the Error Log reports, commands, and command examples.

A Reader's Comment Form and Book Evaluation Form are provided at the back of this book. Use the Reader's Comment Form at any time to give IBM information that may improve the book. After you become familiar with the book, use the Book Evaluation Form to give IBM specific feedback about the book.



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## Related Publications

- *IBM RT PC Guide to Operations* describes the IBM 6150 and IBM 6151 System Units, the displays, keyboard, and other devices that can be attached. This guide also includes procedures for operating the hardware and moving the IBM RT PC System.
- *IBM RT PC User Setup Guide* provides instructions for setting up and connecting devices to the system units. This book also gives procedures for testing the setup and for installing the AIX Operating System. (Packaged with *IBM RT PC Options Installation*)
- *IBM RT PC Options Installation* provides instructions for choosing the correct switch settings, installing optional adapters, installing fixed-disk drives, and installing diskette drives in the IBM 6150 and IBM 6151 System Units. (Packaged with *IBM RT PC User Setup Guide*)
- *IBM RT PC Problem Determination Guide* provides instructions for running diagnostic routines to locate and identify hardware problems. A problem determination guide for software and two high-capacity (1.2MB) diskettes containing the IBM RT PC diagnostic routines are included.
- *IBM RT PC Hardware Technical Reference* is a two-volume set. Volume I describes how the system unit operates, including I/O interfaces, serial ports, memory interfaces, and CPU interface instructions. Volume II describes adapter interfaces for optional devices and communications and includes information about IBM Personal Computer family options and the adapters supported by the IBM RT PC System. (Available optionally)
- *IBM 6157 Streaming Tape Drive Setup and Operating Instructions* provides instructions for setting up and operating the IBM 6157 Streaming Tape Drive. This pamphlet also describes procedures for cleaning the recording head of the tape drive and handling tape cartridges.

- *Setup Instructions for the IBM PC Network Short, Medium, and Long Distance Kits* provides instructions for setting up and connecting the short, medium, and long distance expanders.
- *Setup Instructions for the IBM PC Network Transformer and Translator Unit* provides instructions for setting up and connecting the transformer and translator.
- *IBM 5085 Graphics Processor Maintenance Information Manual*, SY66-0101
- *IBM 5081-1,2 Display Maintenance Information Manual*, SY66-0102
- *IBM 5080 Attachment Adapter Manual*

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- To order from your IBM representative, use Order Number SV21-8025.
- To order from your IBM dealer, use Part Number 08F3465.

A binder and wrap plugs are included with the order.



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## **Section 1. System Description**



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## About this Section

This section contains a brief description of the three units that make up the basic IBM RT Personal Computer<sup>1</sup> System. These descriptions are for the minimum system. Your system may contain devices that are not described in this section. For service information on a particular device, see the section for that type of device.

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<sup>1</sup> Trademark of IBM

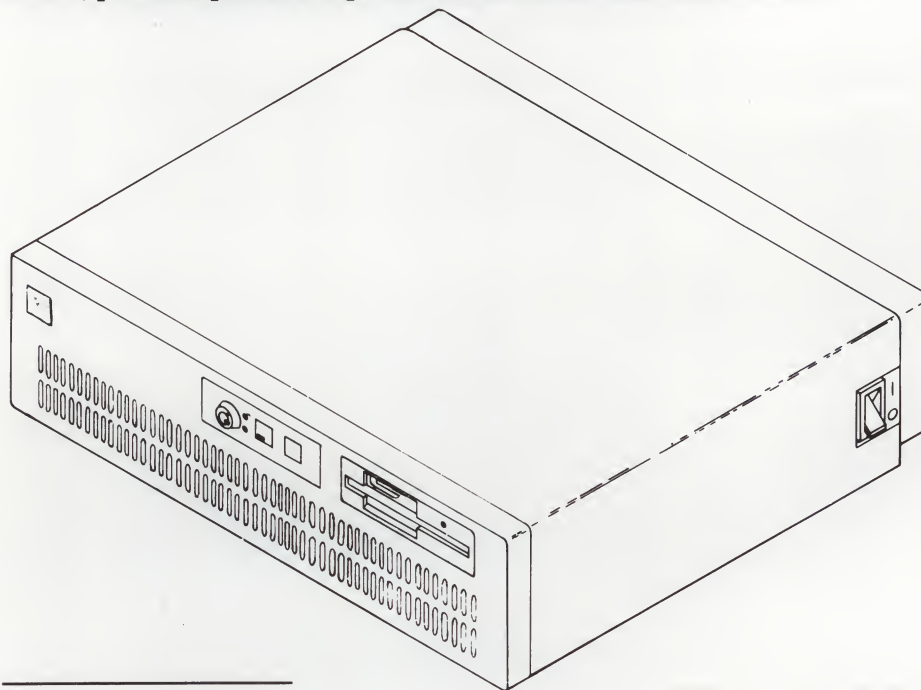
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## Introduction

The IBM RT<sup>2</sup> PC System is a table-top system consisting of a system unit, display, and keyboard. Your system may contain other devices such as printers and communication devices.

## System Unit

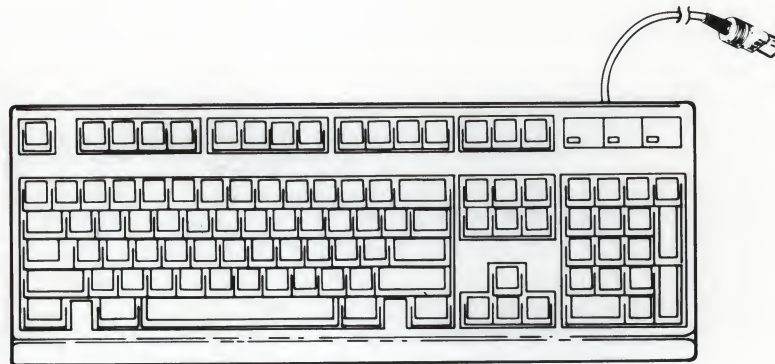
The IBM 6151 System Unit contains the processor, optional floating-point board, system memory, power supply, fixed-disk drive, diskette drive, and the adapters for the keyboard, display, fixed-disk drive, diskette drive, mouse, printers, plotters, tape drive, and communication devices.



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## Keyboard

The keyboard is shipped with the system unit. The keyboard adapter is built into the system board. The keyboard attaches to the keyboard connector on the rear panel of the system unit.

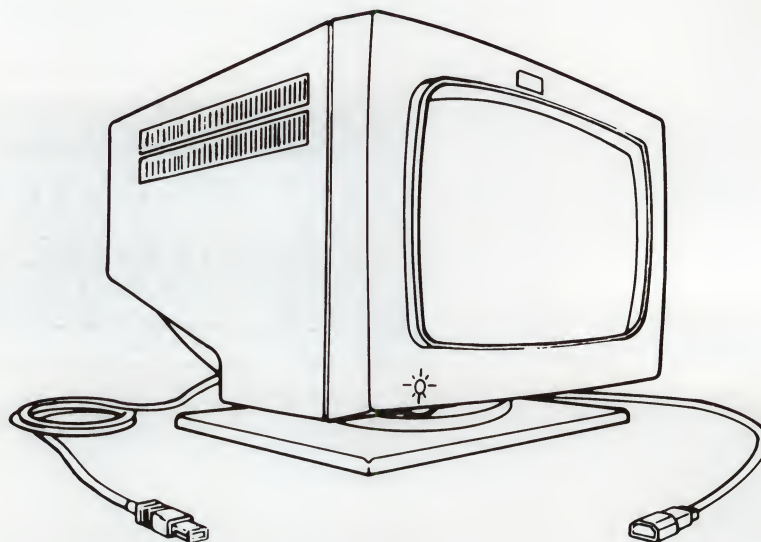




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## Display

Several types of display devices can be attached to the system unit. An adapter that is compatible with both the system unit and the display device must be installed in the system unit.



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## About this Section

This section contains descriptions of the diagnostic programs available on the IBM RT PC Diagnostic Diskettes and a description of the service request number.

Section 3 directs you in the use of these programs during problem isolation.

Use the contents list on the previous page to find information about the diagnostic programs or the service request number.



## Introduction to Diagnostics

**Note:** Some system unit components do not cool properly and may fail intermittently when covers are off. For this reason do not power the system unit on longer than 10 minutes with the covers off.

The diagnostic programs are divided into six types:

- The ***Resident Power-On Self-Test*** (POST) programs are in ***Read-Only Memory*** (ROM) modules on the processor board. These programs run when the system unit is first powered on.

The Resident POST programs check the system unit components needed to load programs from the fixed disk or diskette. See page 2-6 for more information about the Resident POST programs.

- The ***Loadable POST*** programs load from the fixed disk or the diagnostic diskettes. These programs run when the Resident POST programs complete.

The Loadable POST programs first sense the adapters and options installed in the system unit and build an ***Installed Features List***. Before any checkout routines are run, the installed features list is compared to the ***Configuration Record*** on the fixed disk. See page 2-6 for more information about the Loadable POST programs.

Pressing the **Ctrl-Alt-Pause** keys cause the Loadable POST programs to run.

- The ***Diagnostic Routines*** are on the diagnostic diskettes. The ***Problem Determination Guide*** directs the system user to run the Diagnostic Routines to check the system unit during problem determination. See page 2-11 for more information about the Diagnostic Routines.

- The **Utilities** are on the diagnostic diskettes. They provide utility functions such as exercising communication links, and displaying special information.

The Utility programs are used in a non-directed manner to provide control and information to the system user or service technician. See page 2-13 for more information about the Utilities.

- The **Advanced Diagnostic Routines** are on the diagnostic diskettes. They are used by the service technician to isolate failures to a **Field-Replaceable Unit (FRU)**.

The Advanced Diagnostic Routines do the same tests as the Diagnostic Routines plus additional tests that require action by the service technician. The additional tests may require the use of wrap plugs, keying certain patterns on the keyboard, or answering questions about displayed information. See page 2-16 for more information about the Advanced Diagnostic Routines.

- The **Installation Verification** option compares the installed features list built by the Loadable POST programs to the configuration record on the fixed disk. See page 2-17 for more information about the Installation Verification option.

When a problem is detected, the **Problem Determination Procedures (PDPs)** in the **Problem Determination Guide** direct the system user in a checkout of the IBM RT PC System Unit. The PDPs ask the system user to record a **Service Request Number (SRN)** and provide it to the service organization. The service technician uses the SRN to determine which FRU is needed to repair the system. See page 2-19 for more information about the SRNs.



## Power-On Self-Test

The resident Power-On Self-Test (POST) programs are in Read-Only Memory (ROM) modules on the processor board. These programs run when the system unit is first powered on. When the resident POST programs complete, additional POST programs load from the fixed disk or from the diagnostic diskettes.

Numbers display on the *two-digit display* to track the progress of the POST programs. Some tests may run so quickly that the numbers may not be visible.

**Note:** The following chart is for “steady” numbers only. Flashing (about one second) numbers are for software failures. See “Two-Digit Display Codes During Diagnostic Programs” on page 2-18 for flashing numbers during the diagnostic checkouts.

Number	Test description
88	Displays for one second to provide a lamp test. If “88” is displayed steady, the 32-bit processor has stopped.
00, 0c	If installed, this test resets the IBM Monochrome Display and Printer Adapter.
01, 1c	Tests the ROM modules on the processor board.
02	Tests for correct communication between the 32-bit processor and the system board.
03, 3c	Tests the memory controller on the processor board and the system memory boards in slots C and D.
04, 4c	Tests the processor board.
05, 5c	Tests the processor board.
07, 7c	Tests the I/O channel controller on the system board.



Number	Test description
08, 8c	Tests the I/O channel controller on the system board.
09	Tests the keyboard adapter on the system board and the indicators on the keyboard.
99	Shows testing was stopped because the keylock is in the Locked position.
10	Tests the interval timer on the system board.
11	Tests the interrupt controller on the system board.
12	Tests the direct memory access controller on the system board.
13	Tests the built-in serial ports.
14	Tests the fixed-disk drive adapter.
15	Tests the fixed-disk drive adapter.
16	Tests the diskette drive adapter.
17	Tests the diskette drive adapter.
Beep	Tests the speaker in the keyboard.
20	Tests the battery-powered memory on the system board.
21	An attempt is being made to do an IPL, using the devices specified in the battery-powered memory.
22	An attempt is being made to do an IPL, using the default devices specified in the ROM on the processor board.
23	None of the IPL devices specified in the battery-powered memory or the ROM default list could be identified.
25	An error occurred during IPL. The system unit must be powered off to clear this error.
26	An IPL operation is in progress.

Number	Test description
27	The memory capacity was exceeded during IPL.
29	The IPL operation is beginning.
30 - 87	Individual adapter or device tests.
89	A machine or program check was detected.
Blank	This is the normal condition after the POST programs complete.

## Standalone Diagnostic Program Descriptions

The IBM RT PC Diagnostic Diskettes contain the diagnostic programs used to check out and test the system. The diskettes are provided in the *Problem Determination Guide*. The Diagnostics 1 (DIAG-1) diskette is inserted in diskette drive A before the system unit is powered on. After the diagnostic programs load, you are instructed when to change diskettes.

The diagnostic programs do not require an *Operating System* or any other *Licensed Program*. Loading the diagnostic programs removes all other programs from memory.

## Loading Additional Device Drivers

The RT PC diagnostic programs provide the capability to load additional device drivers while loading the diagnostic programs. For example, if the device driver for an installed display is not present on the IBM RT PC Diagnostic Diskettes, a two-digit code of 94 displays. This code identifies the need for a display device driver. Other codes identify the other types of devices.



When an additional device driver is needed, do the following:

1. Remove the RT PC Diagnostic Diskette.
2. Depending on the two-digit code, obtain the correct diskette containing the device driver needed. Insert it into the diskette drive. The driver will load without any additional action.
3. Follow the instructions displayed or instructions with the device driver diskette. If a flashing two-digit code displays, the diskette failed to load. See the information with the device driver.

## Loading the Diagnostic Diskette

**Note:** Before loading the diagnostic programs, all other programs and operating systems must be stopped to prevent loss of data.

Do the following to load the diagnostic programs:

1. Be sure that all programs or operating systems are stopped (get help if needed).
2. Set the power switch on the system unit to Off. If attached, set the power switch on the IBM 5085 to Off.
3. If present, remove the write-protect tab from the diagnostic diskettes.
4. Insert the Diagnostics 1 (DIAG-1) diskette in drive A and close the drive.
5. Set the keylock to Unlock.
6. If the IBM 5085 is attached, be sure the System Diskette is in the IBM 5085, then set the power switch to On.



7. Set the power switch on the IBM RT PC system unit and display to On.
8. Wait for the DIAGNOSTIC OPERATING INSTRUCTIONS to display (this may take up to 4 minutes).
9. If the IBM 5085 is attached, press and hold the Alt key and press the Sw Keybd key. This switches the keyboard to the IBM 6150. The Sw Keybd indicator should be On.
10. Read and follow the displayed instructions. If needed, use the program descriptions in this section for information.

## Key Descriptions

The key descriptions provided here are from the DIAGNOSTIC OPERATING INSTRUCTIONS displayed when the diagnostic programs load. Use them to control the diagnostic programs.

Key	Function
Enter	Signals the program to continue
End	Stops the test or action
F10	Return to the previous menu
Esc	Returns to the DIAGNOSTIC OPERATING INSTRUCTIONS
Page Down	Scrolls forward in a list
Page Up	Scrolls backward in a list
Backspace	Allows keying errors to be corrected
Ctrl-Alt-Pause	Does an initial program load (IPL).

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## Diagnostic Routines

The Diagnostic Routines allow the system user to checkout the system with minimum action. These routines are used during problem determination to determine if the system hardware has a problem and provide a Service Request Number (SRN) for the service organization.

The Diagnostic Routines run more extensive tests on the adapters and options than the Power-On Self-Test (POST) programs. The checkout options displayed are from the configuration record on the fixed disk. If the configuration record on the fixed disk does not match the installed features list, the program displays the TEST OPTION or the DIAGNOSTIC TEST LIST menu.

When an option is listed in the configuration record but is not sensed by the Loadable POST programs, the TEST OPTION menu displays. This menu indicates that either the option has been removed from the system, the option is failing, the switch settings have been changed, or the option has been moved to another slot.

When the Loadable POST programs sense an option that is not in the configuration record, the DIAGNOSTIC TEST LIST menu displays. This menu indicates an option has been added to the system. When an option is deleted from the DIAGNOSTIC TEST LIST menu, that option is not tested until added to the list using the Show and Change Diagnostic Test List Utility.

To run the Diagnostic Routines:

1. Press **Enter** after reading the DIAGNOSTIC OPERATING INSTRUCTIONS.
2. Choose Diagnostic Routines on the FUNCTION SELECTION menu.
3. Choose a checkout option on the DIAGNOSTIC SELECTION menu. An \* (asterisk) by the ID number shows that the test has been run.



The Diagnostic Routines options and their functions are:

### **System Checkout**

The System Checkout option checks all the installed features to the extent that they can be tested without special actions.

### **Keyboard Checkout**

The Keyboard Checkout option checks the keyboard adapter and keyboard.

### **Display Checkout**

The Display Checkout option checks the display adapter and the attached display. The Display Checkout displays a pattern. Follow the instructions displayed for that pattern.

### **Diskette Drive(s) Checkout**

The Diskette Drive(s) Checkout option checks the diskette adapter and the diskette drives. A formatted blank Double Sided diskette is required to check the ability of the drive to read a double sided diskette.

### **Fixed-Disk Drive(s) and Media Checkout**

The Fixed-disk Drive(s) and Media Checkout option checks all the fixed-disk drives installed in the system unit. This option does a function test of each drive and provides for selection of a read test to check all sector addresses.

### **Other Checkout Options**

The other device checkout options check the adapters and devices installed in the system unit. Your system displays the checkout options for the devices installed.



---

## Utilities

The Utility programs are on the IBM RT PC Diagnostic Diskettes. They provide utilities to:

- Format a fixed disk
- Copy the diagnostic diskette
- Exercise the Ethernet<sup>1</sup> Network
- Display the installed features list
- Change the diagnostic test list
- Format the fixed disks on the IBM 9332
- Download microcode to the IBM 9332
- Display and alter the Vital Product Data record on the IBM 9332 fixed disk.

To run the Utilities:

1. Press **Enter** after reading the DIAGNOSTIC OPERATING INSTRUCTIONS.
2. Choose Utilities on the FUNCTION SELECTION menu.
3. Choose the type of utilities on the UTILITY SELECTION menu.

The following topics describe the different types of Utilities and their options:

---

<sup>1</sup> Trademark of the Xerox Corporation

## Fixed Disk Utilities

**Note:** The Format Fixed-Disk utility erases all data on the fixed disk and reformats the fixed disk. Before using this utility, backup all data on the fixed disk being formatted.

Use the Format Fixed-Disk utility only when intermittent read or write errors have occurred on the fixed disk or the diagnostic programs instruct you to use this utility. The Format Fixed-Disk utility formats the fixed disk and writes new addresses on it.

## Diagnostic Diskette Copy Utility

The Diagnostic Diskette Copy Utility provides a program to copy the diagnostic diskettes. The utility provides the following:

- A message when the *source* diskette is needed
- A message when the *target* diskette is needed
- A warning message to tell the system operator that the data on the target diskette will be destroyed
- Formatting of the target diskette
- Copying of the data from the source diskette to the formatted target diskette.

You may have to change the source and target diskettes during the copying procedure. A message displays to inform you when to change the diskettes.

---

## Utilities for Use with ETHERNET

The Utilities for Use with ETHERNET provide a means to exercise the IBM RT PC Baseband Adapter and part of the Ethernet Network. The utility transmits a block of data addressed to itself. The utility then checks the response of the adapter and the network status to determine if it is operating correctly. This utility works with both the wrap plug and with a functional Ethernet Network.

The result of the test is displayed in the UTILITIES FOR USE WITH ETHERNET SELECTION menu.

### Show Installed Options Utility

The Show Installed Options Utility displays the installed features list created by the Loadable POST programs. All IBM adapters and devices installed in the system unit and recognized by the Loadable POST program are displayed. Use this list to check the configuration of the system.

### Show and Change Diagnostic Test List Utility

The Show and Change Diagnostic Test List Utility displays the diagnostic test list. Menus guide you in changing the list. Only options that are installed in your system can be added to the list.

## | IBM 9332 Utilities

| The IBM 9332 Utilities provide the following:

- | • A utility to download microcode to the IBM 9332 from a diskette.
- | • A utility to display and alter the Vital Product Data record on the IBM 9332 fixed disk.
- | • A utility to format the fixed disk on the IBM 9332. This utility erases all data and formats the fixed disk.



## Advanced Diagnostic Routines

The Advanced Diagnostic Routines options allow the service technician to perform tests on the system unit that require special action such as installing wrap plugs or keying certain responses. The *Problem Isolation Charts* (PICs) use the Advanced Diagnostic Routines to perform the additional tests and repair checkouts.

The Advanced Diagnostic Routines run more extensive tests on the adapters that can be tested with wrap plugs than the Diagnostic Routines. If the configuration record on the fixed disk does not match the installed features list, the program displays the TEST OPTION or the DIAGNOSTIC TEST LIST menu.

When an option is listed in the configuration record, but is not sensed by the Loadable POST programs, the TEST OPTION menu displays. This menu indicates that either the option has been removed from the system, the option is failing, the switch settings have been changed, or the option has been moved to another slot.

When the Loadable POST programs sense an option that is not in the configuration record, the DIAGNOSTIC TEST LIST menu displays. This menu indicates an option has been added to the system. When an option is deleted from the DIAGNOSTIC TEST LIST menu, that option is not tested until added to the list using the Show and Change Diagnostic Test List Utility.

To run the Advanced Diagnostic Routines:

1. Press **Enter** after reading the DIAGNOSTIC OPERATING INSTRUCTIONS.
2. Choose Advanced Diagnostic Routines on the FUNCTION SELECTION menu.
3. Choose a checkout option on the ADVANCED DIAGNOSTIC SELECTION menu. An \* (asterisk) by the ID number shows that the test has been run.

---

## Installation Verification

The Installation Verification program compares the installed features list created by the Loadable POST programs to the configuration record on the fixed disk.

The Installation Verification program is run during installation and setup to check all the adapters and options after shipment. The program assumes the Diagnostic Routines were run after the last change to the system unit. Running the Diagnostic Routines updates the configuration record on the fixed disk.

To run the Installation Verification:

1. Press **Enter** after reading the **DIAGNOSTIC OPERATING INSTRUCTIONS**.
2. Choose Installation Verification on the **FUNCTION SELECTION** menu.
3. If the installed features list and configuration record do not match, follow the instructions displayed.

## Two-Digit Display Codes During Diagnostic Programs

The following chart is for flashing (approximately one second) numbers displayed in the two-digit display while running the standalone diagnostic programs.

Number	Description of the Problem
02	A read error occurred while using the diskette drive.
99	A program check or a machine check occurred.
c6	An undetermined programming error occurred.



---

## Service Request Number Description

When a problem is detected with system operation, the Problem Determination Procedures (PDPs) in the *Problem Determination Guide* are used to determine the cause and corrective action. If the PDPs determine the failure is in the hardware, the system user is given a Service Request Number (SRN) to record for use by the service organization.

The SRN is used by the service technician to determine which field-replaceable unit (FRU) is needed to repair the system. The SRN contains from one to four **Service Repair Action** (SRA) numbers. Each SRA number represents a FRU or a special repair action.

The Problem Isolation Charts (PICs) in Section 3 use the SRA numbers to isolate the failure to a failing FRU. Appendix B contains an SRA to FRU Cross-Reference List to provide the service technician with the part number of the failing FRU.

An SRN always contains a **Source Number** and at least one SRA. See the following pages for a description of the source number and the SRA numbers. The following example of an SRN contains a source number and four SRA numbers.

1 3 - 2 3 4 - 1 0 0 - B 3 4 - D 6 4

## Source Number

The left two digits of the SRN is the source number. The left digit of the source number identifies the device. The right digit of the source number identifies the procedure that produced the SRN. The following chart identifies the devices and procedures. Use the following SRN for an example.

1 3 - 2 3 4 - 1 0 0 - B 3 4 - D 6 4

Device	Procedure
1 - System unit	1 - Resident POST program
2 - Display	2 - Loadable POST program
3 - Keyboard	3 - Standalone diagnostic program
4 - Tape drive	4 - Licensed program product
5 - Printer	5 - Support center
6 - Plotter	6 - Problem determination procedures
7 - Reserved	7 - The device was not found when the diagnostic programs loaded
8 - Mouse	8 - Reserved
9 - Attached communications device	9 - Reserved
0 - Reserved	0 - Reserved
A - Tablet	
B - Dials Feature	
C - LPFK Feature	

## Service Repair Action Number

The remaining digits of the SRN are divided into three-digit SRA numbers. The left two digits of the SRA number is the FRU/PIC code. The right digit of the SRA number is the location number. Use the following SRN for an example.

1 3 - 2 3 4 - 1 0 0 - B 3 4 - D 6 4

FRU/PIC Code	Location
See the "Service Repair Action Number Chart" in Section 3 or Appendix B for more information.	1 - Adapter slot 1
	2 - Adapter slot 2
	3 - Adapter slot 3
	4 - Adapter slot 4
	5 - Adapter slot 5
	6 - Adapter slot 6
	7 - Adapter slot 7
	8 - Adapter slot 8
	9 - Reserved
	0 - System board
	A through R - Identifies system board slots, drive positions, switch banks, or memory module positions.





## **Section 3. Problem Isolation Charts**

## CONTENTS

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POST Errors 5c PIC 9870 .....	3-9870-1



## About this Section

This section contains the information used by the service technician to isolate the problem to a field-replaceable unit.

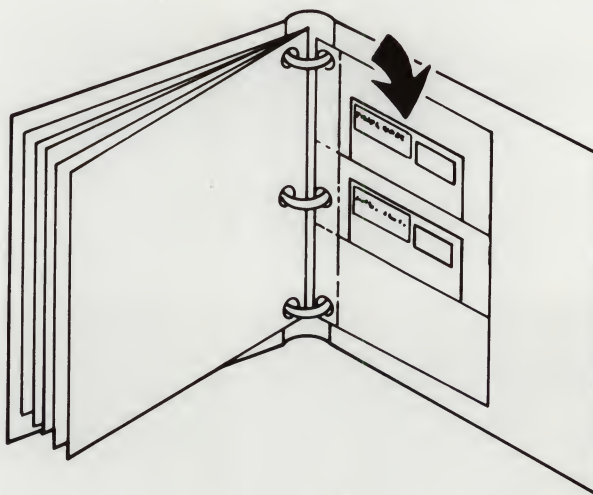
Start all problem isolation with "Start of Call PIC 0010" on page 3-0010-1.

## Introduction

Begin the problem isolation at “Start of Call PIC 0010” on page 3-0010-1, then carefully follow the steps to isolate the failure to a field-replaceable unit.

The RT PC System Unit problem isolation procedures use the IBM RT PC Diagnostic Diskettes and run tests from the **ADVANCED DIAGNOSTIC SELECTION** menu. The diagnostic diskettes are stored in the *Problem Determination Guide*.

Information about the tools required is in Appendix A.



---

## Start of Call PIC 0010

### Read these notes:

1. Some system unit components do not cool correctly when the cover is off. For this reason do not power the system unit on longer than 10 minutes with the cover off.
2. Be sure to follow the instructions carefully. Do not do any actions such as; removing the diskette, operating the mouse, or keying characters, unless directed by the instructions.
3. Be sure that all programs or operating systems are stopped (get help if needed).
4. If the IBM 6150 System Unit is connected to an IBM 5085 Graphics Processor, do the following before loading the diagnostics:
  - a. Set the power switch on the IBM 5085 to Off.
  - b. Be sure the IBM 5085 System Diskette is in the IBM 5085, then set the power switch to On.
  - c. Load the diagnostic programs in the IBM 6150.
  - d. Switch the keyboard to the IBM 6150 (Alt-Sw Keybd).
5. If the problem is with the IBM 5085 or a device attached to the IBM 5085, go to the maintenance instructions for the IBM 5085.



## Step 1

You should have an SRN either from information recorded on the "Appendix B. Problem Form" from the *Problem Determination Guide* or from diagnostic tests results. If needed, see "Service Request Number Description" on page 2-19 for a description of the SRN.

---

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

### **DO YOU HAVE A SERVICE REQUEST NUMBER?**

---

**NO**      Go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.

**YES**      Continue on the next page.

---

**Step 2**

Look at the SRN. If needed, see 2-20.

---

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

**IS THE PROCEDURE NUMBER A "1," "2," "3," or "7"?**

---

- NO** Go to the "Problem Determination Procedure PIC 0030" on page 3-0030-1 and verify the SRN. Use the new SRN to analyze the problem.
- YES** Continue on the next page.

**Step 3**

Compare the leftmost SRA number in your SRN to the SRAs in the table below.

<b>SRA Number</b>	<b>Go to PIC</b>
21x	"Memory Expansion Option PIC 2100" on page 3-2100-1
37x	"Memory Expansion Option PIC 2100" on page 3-2100-1
42x	"IBM PC Enhanced Graphics Adapter Memory PIC 4200" on page 3-4200-1
44x	"IBM PC Enhanced Graphics Adapter Memory PIC 4200" on page 3-4200-1
880	"Power Supply PIC 8800" on page 3-8800-1
981	"POST Errors 03 or 05 PIC 9810" on page 3-9810-1
984	"POST Error 23 PIC 9840" on page 3-9840-1
986	"Undetermined Problem PIC 9860" on page 3-9860-1
987	"POST Errors 5c PIC 9870" on page 3-9870-1

**IS THE LEFTMOST SRA NUMBER OF YOUR SRN IN THE TABLE?**

**YES**      Go to the PIC indicated in the table.

**NO**        Continue on the next page.



## Step 4

Count the SRA numbers in your SRN.

4. Write the Service Request Number here:

16 - 987 - \_\_\_\_ - \_\_\_\_ - \_\_\_\_

**DOES YOUR SERVICE REQUEST NUMBER CONTAIN ONLY ONE SERVICE REPAIR ACTION NUMBER?**

**YES** Do the following:

1. Find your SRA number in the "Service Repair Action Number Chart PIC 0020" on page 3-0020-1.
2. Record the FRU name, repair checkout procedure, and the removal procedure reference.
3. Go to "Step 9" on page 3-0010-10.

**NO** Continue on the next page.

## Step 5

Look at the SRN. If needed, see page 2-20.

---

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

---

### IS THE PROCEDURE NUMBER A "3"?

**NO**

Do the following:

1. Find the leftmost SRA number in the "Service Repair Action Number Chart PIC 0020" on page 3-0020-1.
2. Record the FRU name, repair checkout procedure, and the removal procedure reference.
3. Go to "Step 9" on page 3-0010-10.

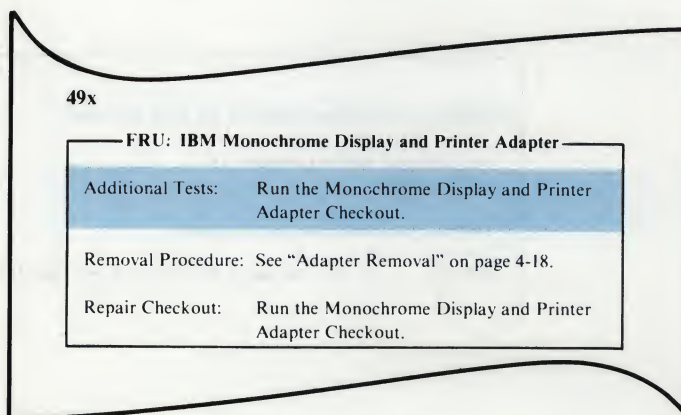
**YES**

Continue on the next page.

**Step 6**

**Note:** The leftmost SRA number is the most likely failing FRU and should be analyzed first.

1. Find the leftmost SRA number in the "Service Repair Action Number Chart PIC 0020" on page 3-0020-1.
2. Record the FRU name, any additional test procedure, the repair checkout procedure, and the removal procedure reference.
3. Return here and answer the following question.

**DOES YOUR SERVICE REPAIR ACTION NUMBER HAVE ADDITIONAL TESTS?**

**NO** Go to "Step 9" on page 3-0010-10.

**YES** Continue on the next page.



## Step 7

**Note:** Use the **ADVANCED DIAGNOSTIC SELECTION** menu to choose the additional test. If needed, see page 2-16.

Run the Additional Tests listed for your SRA number that you have not run since starting to analyze this SRN. If you are not able to select and run the additional tests, go to page 3-0030-1.

If you have run the test previously, use the results from that test to answer this question.

---

<p>THERE IS A HARDWARE PROBLEM IN YOUR MACHINE.</p> <p>The Service Request Number is: 13-521-668</p> <p>WRITE.....down the above number.</p> <p>RETURN.....to the Hardware Maintenance and Service Manual.</p>	DIAG-2
--	--------

---

### DID THE ADDITIONAL TEST RESULT IN A SERVICE REQUEST NUMBER?

---

**NO**      Go to "Step 18" on page 3-0010-19.

**YES**      Continue on the next page.

---

**Step 8**

Look at the SRN from the additional test, and find the leftmost SRA number.

---

THERE IS A HARDWARE PROBLEM IN YOUR MACHINE.

DIAG-2

The Service Request Number is:  
13-521-668

WRITE.....down the above number.

RETURN.....to the Hardware Maintenance and Service Manual.

**IS THE LEFTMOST SERVICE REPAIR ACTION NUMBER THE SAME NUMBER AS THE SERVICE REPAIR ACTION NUMBER YOU HAVE BEEN ANALYZING?**

---

**NO** Do the following:

1. Find the leftmost SRA number from the additional test in the "Service Repair Action Number Chart PIC 0020" on page 3-0020-1.
2. Record the FRU name, the removal procedure reference, and the repair checkout reference.
3. Continue on the next page.

**YES** Continue on the next page.

## Step 9

1. The rightmost digit of the SRA identifies the FRU location. When the rightmost digit is a 0, either the FRU location could not be determined or the FRU is always in the same location. Use the Removal Procedure referenced in the data for your SRA number and exchange the FRU.
2. Use the **ADVANCED DIAGNOSTIC SELECTION** menu to run the Repair Checkout test listed in the data for your SRA number. Record the result. If needed, see page 2-16.

If you exchanged the fixed-disk drive, the **DIAGNOSTIC TEST LIST** menu displays. Be sure the list is correct. If the list is not correct, follow the instructions on the menu to correct the list.

---

TESTING COMPLETE	DIAG-2
No trouble was found.	
Press Enter to continue.	

---

### WERE YOU ABLE TO LOAD AND RUN THE REPAIR CHECKOUT AND DID THE "NO TROUBLE WAS FOUND" MESSAGE DISPLAY?

---

- YES** This completes the repair. If you still have a problem, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1 to get a new SRN.
- NO** Continue on the next page.



## Step 10

Look at the result you recorded after the repair checkout.

49x

### FRU: IBM Monochrome Display and Printer Adapter

Additional Tests: Run the Monochrome Display and Printer Adapter Checkout.

Removal Procedure: See "Adapter Removal" on page 4-18.

Repair Checkout: Run the Monochrome Display and Printer Adapter Checkout.

## WERE YOU ABLE TO SELECT THE REPAIR CHECKOUT TEST?

**YES** Go to "Step 14" on page 3-0010-15.

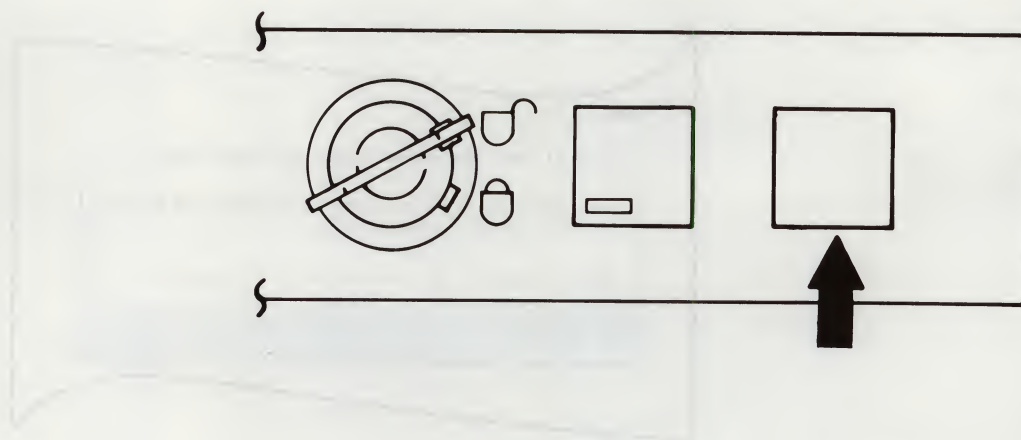
**NO** Continue on the next page.

---

## Step 11

Look at the operator panel.

---



---

### IS THE TWO-DIGIT DISPLAY BLANK?

---

**NO** Do the following:

1. Find the number displayed in the two-digit display in the "POST Indicator Chart PIC 0040" on page 3-0040-1.
2. Record the SRN for that POST number. This is the repair checkout result.
3. Go to "Step 15" on page 3-0010-16.

**YES** Continue on the next page.

---

**Step 12**

Look at the display.

---

<b>TEST OPTION</b>	DIAG-1
The following option was detected previously by the diagnostics, but is now undetected.	
- Option	
Has the option been removed from the system or moved to another slot?	
<u>ID</u>	<u>ITEM</u>

---

**DID THE "TEST OPTION" MENU DISPLAY?**

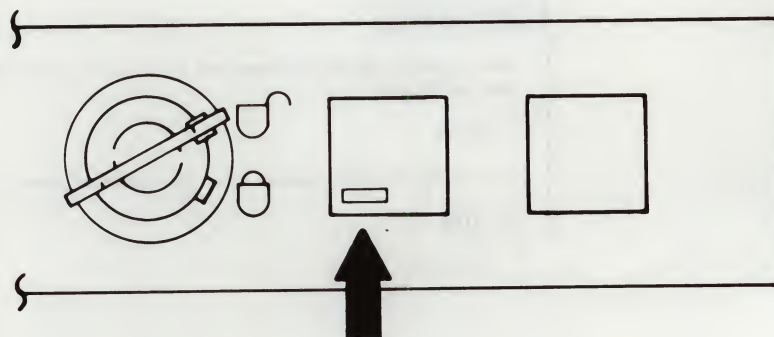
---

- YES**     The TEST OPTION Menu displays when an option is in the configuration record but it was not sensed or it was sensed in a different location during POST.
1. Record the option displayed.
  2. Choose an item on the menu, then record the SRN when it displays. This is the repair checkout result.
  3. Check for proper installation of the option. If the option is a new FRU, it may be defective.
  4. Go to "Step 16" on page 3-0010-17.
- NO**     Continue on the next page.



### Step 13

Look at the operator panel.



#### IS THE POWER-ON INDICATOR ON?

**YES** Go to "Step 17" on page 3-0010-18.

**NO** Be sure that both ends of the external power cable to the system unit are connected.

If you find a problem, go to the step where you were instructed to set the system unit power switch to On and try the procedure again.

If you do not find a problem, go to "Power Supply PIC 8800" on page 3-8800-1.

---

## Step 14

Look at the display.

---

THERE IS A HARDWARE PROBLEM IN YOUR MACHINE.

DIAG-2

The Service Request Number is:

13-521-66B

WRITE.....down the above number.

RETURN.....to the Hardware Maintenance and Service Manual.

---

### DID THE REPAIR CHECKOUT RESULT IN AN SRN?

---

**YES** The SRN displayed is the repair checkout results.

1. Record the SRN displayed.
2. Go to "Step 16" on page 3-0010-17.

**NO** Go to "Undetermined Problem PIC 9860" on page 3-9860-1.  
Use the Repair Checkout procedure as the failing test procedure.

**Step 15**

Look at your SRN.

---

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

**IS THE LEFTMOST SERVICE REPAIR ACTION NUMBER OF YOUR  
SERVICE REQUEST NUMBER "981" THROUGH "987"?**

---

**YES**     Go to "Step 19" on page 3-0010-20.

**NO**     Continue on the next page.



## Step 16

Look at the SRN you recorded after the repair checkout.

4. Write the Service Request Number here:

13 - 234 - 10D - B34 - D64

**DID THE REPAIR CHECKOUT RUN RESULT IN THE SAME SRN  
YOU HAVE BEEN ANALYZING (ignore any location code changes)?**

- NO** Either the system has more than one problem or another problem was created during service. Go to "Step 3" on page 3-0010-4 and analyze the new SRN.
- YES** Remove the new FRU and install the original FRU, then continue on the next page.

---

**Step 17**

Look at the SRN.

---

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

**HAVE YOU ANALYZED ALL THE SRAs IN THE SERVICE REQUEST NUMBER?**

---

**NO** Use this procedure to continue analyzing the SRN.

1. Select another SRA number within the SRN.
2. Find the SRA number in "Service Repair Action Number Chart PIC 0020" on page 3-0020-1.
3. Record the FRU name, the repair checkout procedure, and the removal procedure reference.
4. Go to "Step 9" on page 3-0010-10.

**YES** Continue on the next page.

## Step 18

The following question is used to determine the source of your SRN.

### Problem Determination Procedure PIC 0030

Use this procedure to obtain a Service Request Number (SRN).

This procedure uses the IBM RT PC Diagnostic Diskettes and the advanced diagnostic routines to diagnose hardware problems only.

#### Step 1

Check the system for the following problems:

- Damaged covers
- Loose cables
- Cooling fan not running
- Broken latches, buttons, or switches
- Any other field-replaceable unit (FRU) with physical damage.

DID YOU FIND ONE OF THE ABOVE PROBLEMS?

YES Do the procedure for the problem:

### HAVE YOU USED THE "PROBLEM DETERMINATION PROCEDURE PIC 0030" TO ANALYZE THIS PROBLEM?

**YES** Go to "Unresolved Problem PIC 0060" on page 3-0060-1.

**NO** Go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.



**Step 19**

Find your SRA number in the following table, then go to the PIC listed for your SRA number.

<b>SRA Number</b>	<b>Go to PIC</b>
981	"POST Errors 03 or 05 PIC 9810" on page 3-9810-1
984	"POST Error 23 PIC 9840" on page 3-9840-1
987	"POST Errors 5c PIC 9870" on page 3-9870-1

---

## Service Repair Action Number Chart PIC 0020

The following pages contain reference information. This chart is in numerical sequence followed by alphabetical sequence.

**Note:** If an SRA number was released after this manual was printed, the information for that SRA number may be at the end of PIC 0020 or in a separate booklet.

### 10X

#### FRU: System Board

Additional Tests:	None
Removal Procedure:	See System Board Removal in Section 4.
Repair Checkout:	Run the System Checkout.

### 12X

#### FRU: RT PC 1MB Memory Expansion Option

Additional Tests:	None
Removal Procedure:	See Processor, Floating-Point, or System Memory Removal in Section 4.
Repair Checkout:	Run the System Checkout.

**15x**

**FRU: RT PC 2MB Memory Expansion Option**

Additional Tests:      None

Removal Procedure:    See Processor, Floating-Point, or System  
Memory Removal in Section 4.

Repair Checkout:      Run the System Checkout.

**16x**

**FRU: RT PC 4MB Memory Expansion Option**

Additional Tests:      None

Removal Procedure:    See Processor, Floating-Point, or System  
Memory Removal in Section 4.

Repair Checkout:      Run the System Checkout.

**19x**

**FRU: RT PC Floating-Point Board**

Additional Tests:      None

Removal Procedure:    See Processor, Floating-Point, or System  
Memory Removal in Section 4.

Repair Checkout:      Run the System Checkout.



**1Cx**

**FRU: RT PC Advanced Floating-Point Board**

Additional Tests: None

Removal Procedure: See Processor, Floating-Point, or System Memory Removal in Section 4.

Repair Checkout: Run the System Checkout.

**1Dx**

**FRU: RT PC 4MB Fast Memory Expansion Option**

Additional Tests: None

Removal Procedure: See Processor, Floating-Point, or System Memory Removal in Section 4.

Repair Checkout: Run the System Checkout.

**1Ex**

**FRU: RT PC 8MB Fast Memory Expansion Option**

Additional Tests: None

Removal Procedure: See Processor, Floating-Point, or System Memory Removal in Section 4.

Repair Checkout: Run the System Checkout.

**20x**

**FRU: RT PC AT Coprocessor Option**

Additional Tests: None

Removal Procedure: See "Removal and Replacement Procedures" on page 9-023-1.

Repair Checkout: Run the System Checkout.

**21x**

**FRU: IBM AT 512 KB Memory Expansion Option**

Do not return to the Start of Call PIC, go to "Memory Expansion Option PIC 2100" on page 3-2100-1.

**22x**

**I/O Channel Memory Error**

Additional Tests: None

Removal Procedure: An error occurred in memory attached to the I/O channel between memory addresses 080000 and 09FFFF. This area of memory is not supported as I/O channel memory in the IBM RT PC System. Check for nonsupported memory installed.

Repair Checkout: Run the System Checkout.

**23x**

**FRU: IBM AT Serial/Parallel Adapter**

**Additional Tests:** Run the IBM AT Serial/Parallel Adapter checkout.

**Removal Procedure:** See Adapter Removal in Section 4.

**Repair Checkout:** Run the IBM AT Serial/Parallel Adapter Checkout.

**24x**

**FRU: IBM AT Math Co-Processor Module**

**Additional Tests:** None

**Removal Procedure:** See "Removal and Replacement Procedures" on page 9-023-1.

**Repair Checkout:** Run the System Checkout.



**26x**

**I/O Channel Memory Error**

**Additional Tests:** None

**Removal Procedure:** An error occurred in memory attached to the I/O channel between memory addresses 0E0000 and 0FFFFFFF. This area of memory is not supported as I/O channel memory in the IBM RT PC System. Check for nonsupported memory installed.

**Repair Checkout:** Run the System Checkout.

**28x**

**FRU: RT PC Multiprotocol Adapter**

**Additional Tests:** Run the RT PC Multiprotocol Adapter Checkout.

**Removal Procedure:** See Adapter Removal in Section 4.

**Repair Checkout:** Run the RT PC Multiprotocol Adapter Checkout.

**2Bx**

**FRU: System Board**

Additional Tests:     None

Removal Procedure:   See System Board Removal in Section 4.

Repair Checkout:     Run the System Checkout.

**2Cx**

**FRU: System Board**

Additional Tests:     None

Removal Procedure:   See System Board Removal in Section 4.

Repair Checkout:     Run the System Checkout.

**30x**

**FRU: IBM Token-Ring Network RT PC Adapter**

Additional Tests:     None

Removal Procedure:   See Adapter Removal in Section 4.

Repair Checkout:     Run the Token-Ring Network RT PC  
Adapter Checkout.

**31x**

**FRU: IBM RT PC Network Adapter**

Additional Tests: None

Removal Procedure: See Adapter Removal in Section 4.

Repair Checkout: Run the IBM PC Network Adapter Checkout.

**32x**

**FRU: RT PC 5080 Attachment Adapter**

Additional Tests: None

Removal Procedure: See "Removal Procedure" on page 9-095-2.

Repair Checkout: Run the System Checkout.

**34x**

**FRU: IBM PC 3278/79 Emulation Adapter**

Additional Tests: None

Removal Procedure: The long adapter is no longer available, use the short adapter. See Adapter Removal in Section 4.

Repair Checkout: Run the System Checkout.



**35x**

**FRU: 4-Port Asynchronous RS-232C Adapter (Buffered)**

**Additional Tests:** Run the RT PC 4-Port Asynchronous RS-232C Adapter Checkout.

**Removal Procedure:** See Adapter Removal in Section 4.

**Repair Checkout:** Run the RT PC 4-Port Asynchronous RS-232C Adapter Checkout.

**36x**

**I/O Channel Memory Error**

**Additional Tests:** None

**Removal Procedure:** An error occurred in memory attached to the I/O channel between memory addresses 0E0000 and 0FFFFFFF. This area of memory is not supported as I/O channel memory in the IBM RT PC System. Check for nonsupported memory installed.

**Repair Checkout:** Run the System Checkout.

**37x**

**FRU: IBM AT 512 KB Memory Expansion Option Module**

Do not return to the Start of Call PIC, go to "Memory Expansion Option PIC 2100" on page 3-2100-1.

**38x**

**FRU: RT PC 5080 Peripheral Adapter**

Additional Tests: Run the RT PC 5080 Peripheral Adapter Checkout.

Removal Procedure: See Adapter Removal in Section 4.

Repair Checkout: Run the RT PC 5080 Peripheral Adapter Checkout.

**39x**

**FRU: 4-Port Asynchronous RS-422A Adapter (Buffered)**

Additional Tests: Run the RT PC 4-Port Asynchronous RS-422A Adapter Checkout.

Removal Procedure: See Adapter Removal in Section 4.

Repair Checkout: Run the RT PC 4-Port Asynchronous RS-422A Adapter Checkout.

**3Ax**

**FRU: RT PC S/370 Host Interface Adapter**

Additional Tests: None

Removal Procedure: See "Removal Procedure" on page 9-097-2.

Repair Checkout: Run the System Checkout.

**40x**

**FRU: RT PC Baseband Adapter**

Additional Tests: Run the RT PC Baseband Adapter Checkout.  
Removal Procedure: See Adapter Removal in Section 4.  
Repair Checkout: Run the RT PC Baseband Adapter Checkout.

**41x**

**FRU: IBM PC Enhanced Graphics Adapter**

Additional Tests: Run the Display Checkout.  
Removal Procedure: See "Removal and Replacement Procedures" on page 9-042-1.  
Repair Checkout: Run the Display Checkout.

**42x**

**FRU: IBM PC Graphics Memory Expansion Card**

Do not return to the Start of Call PIC, go to "IBM PC Enhanced Graphics Adapter Memory PIC 4200" on page 3-4200-1.



**43x**

**FRU: Advanced Monochrome Graphics Display Adapter**

Additional Tests: Run the Display Checkout.

Removal Procedure: See Adapter Removal in Section 4.

Repair Checkout: Run the Display Checkout.

**44x**

**FRU: IBM PC Graphics Memory Expansion Module**

Do not return to the Start of Call PIC, go to "IBM PC Enhanced Graphics Adapter Memory PIC 4200" on page 3-4200-1.

**45x**

**FRU: RT PC Advanced Color Graphics Display Adapter**

Additional Tests: Run the Display Checkout.

Removal Procedure: See Adapter Removal in Section 4.

Repair Checkout: Run the Display Checkout.

**47x**

**FRU: Extended Monochrome Graphics Display Adapter**

Additional Tests: Run the Display Checkout.

Removal Procedure: See Adapter Removal in Section 4.

Repair Checkout: Run the Display Checkout.

**49x**

**FRU: IBM Monochrome Display and Printer Adapter**

Additional Tests: Run the IBM Monochrome Display and Printer Adapter Checkout.

Removal Procedure: See Adapter Removal in Section 4.

Repair Checkout: Run the IBM Monochrome Display and Printer Adapter Checkout.

**4Ax**

**FRU: IBM Megapel Display Processor**

Additional Tests: Run the Display Checkout.

Removal Procedure: See "Removal Procedure" on page 9-053-2.

Repair Checkout: Run the Display Checkout.

**4Bx**

**FRU: IBM Megapel Display Controller**

- Additional Tests:** Run the Display Checkout and if listed, the IBM Megapel Parallel Port Checkout.
- Removal Procedure:** See "Removal Procedure" on page 9-053-2.
- Repair Checkout:** Run the Display Checkout and if listed, the IBM Megapel Parallel Port Checkout.

**52x**

**FRU: IBM AT Fixed-Disk and Diskette Drive Adapter**

- Additional Tests:** None
- Removal Procedure:** See Adapter Removal in Section 4.
- Repair Checkout:** If your SRN also contains an SRA number of 98A, each fixed disk attached to this adapter must be formatted again.
- Note:** This destroys all data recorded on the fixed disk.
- To format the fixed disk, use the Format Fixed-Disk utility. If needed, see Section 2.
- Run the System Checkout.



**53x**

**FRU: Battery**

Additional Tests:     None

Removal Procedure:   See Battery Removal in Section 4.

Repair Checkout:     Run the System Checkout.

**54x**

**FRU: IBM 5151 Personal Computer Display**

Additional Tests:     Run the Display Checkout.

Removal Procedure:   See Attached Device Removal in Section 4.

Repair Checkout:     Run the Display Checkout.

**58x**

**FRU: IBM 5154 Enhanced Color Display**

Additional Tests:     Run the Display Checkout.

Removal Procedure:   See Attached Device Removal in Section 4.

Repair Checkout:     Run the Display Checkout.

## 59x

### FRU: IBM 6154 Advanced Color Graphics Display

Additional Tests: Run the Display Checkout.

Removal Procedure: See Attached Device Removal in Section 4.

Repair Checkout: Run the Display Checkout.

## 5Bx

**Note:** References to the RT PC Small Computer Systems Interface Adapter is abbreviated as RT PC SCSI Adapter in this publication.

### FRU: RT PC SCSI Adapter

Additional Tests: Run the RT PC SCSI Adapter Checkout.

Removal Procedure: See the following note, then see Adapter Removal in Section 4.

**Note:** Check the fuse before replacing the adapter. If the fuse is defective, exchange the fuse.

Repair Checkout: Run the RT PC SCSI Adapter Checkout.

**5Cx**

**FRU: IBM RT PC SCSI Adapter Fuse**

Additional Tests: Run the RT PC SCSI Adapter Checkout.

Removal Procedure: See Adapter Removal in Section 4, then exchange the fuse.

Repair Checkout: Run the RT PC SCSI Adapter Checkout.

**60x**

**FRU: IBM 6153 Advanced Monochrome Graphics Display**

Additional Tests: Run the Display Checkout.

Removal Procedure: See Attached Device Removal in Section 4.

Repair Checkout: Run the Display Checkout.

**61x**

**FRU: IBM 5081 Display**

Additional Tests: Go to the IBM 5081 MIM.

Removal Procedure: See the IBM 5081 MIM.

Repair Checkout: Run the Display Checkout.



**62x**

**FRU: IBM 6155 Extended Monochrome Graphics Display**

Additional Tests: Run the Display Checkout.

Removal Procedure: See Attached Device Removal in Section 4.

Repair Checkout: Run the Display Checkout.

**63x**

**FRU: Operator Panel Board**

Additional Tests: None

Removal Procedure: See Operator Panel Board Removal in Section 4.

Repair Checkout: Run the System Checkout. The two-digit display displays 88 immediately after the power switch is set to On for a lamp test. In normal operation, the two-digit display is blank when the POST programs complete.

**64x**

**FRU: IBM AT High Capacity Diskette Drive**

Additional Tests: Run the Diskette Drive(s) Checkout.

Removal Procedure: See Diskette Drive Removal in Section 4.

Repair Checkout: Run the Diskette Drive(s) Checkout.

**66x**

**FRU: IBM AT Dual-Sided Diskette Drive**

**Additional Tests:** Run the Diskette Drive(s) Checkout.

**Removal Procedure:** See Diskette Drive Removal in Section 4.

**Repair Checkout:** Run the Diskette Drive(s) Checkout.

**70x**

**FRU: Fixed-Disk Drive Type R70**

**Additional Tests:** None

**Removal Procedure:** See Fixed-Disk Drive Removal in Section 4.

**Repair Checkout:** Run the Fixed-Disk Drive(s) and Media Checkout.

**74x**

**FRU: Fixed-Disk Drive Type R40**

**Additional Tests:** None

**Removal Procedure:** See Fixed-Disk Drive Removal in Section 4.

**Repair Checkout:** Run the Fixed-Disk Drive(s) and Media Checkout.

**77x**

**FRU: Fixed-Disk Drive Type E70**

Additional Tests: None

Removal Procedure: See Fixed-Disk Drive Removal in Section 4.

Repair Checkout: Run the Fixed-Disk Drive(s) and Media Checkout.

**78x**

**FRU: Keyboard**

Additional Tests: None

Removal Procedure: See the Keyboard Removal Procedure in Section 10.

Repair Checkout: Run the Keyboard Checkout.

**79x**

**FRU: Mouse**

Additional Tests: None

Removal Procedure: See the Mouse "Removal Procedure" on page 10-143-1.

Repair Checkout: Run the Mouse Checkout.



## 7Ax

### FRU: IBM 5085 Dials Feature

- Additional Tests:** Run the Dials Checkout.
- Removal Procedure:** See the Dials Feature "Removal Procedure" on page 10-146-2.
- Repair Checkout:** Run the Dials Checkout.

## 7Bx

### FRU: IBM 5085 LPFK Feature

- Additional Tests:** Run the Lighted Program Function Keyboard Checkout.
- Removal Procedure:** See the LPFK Feature "Removal Procedure" on page 10-147-2.
- Repair Checkout:** Run the Lighted Program Function Keyboard Checkout.

## 7Cx

### FRU: Stylus for the Model 11 and 12 Tablet

- Additional Tests:** Run the IBM 5083 Model 1x Tablet Checkout.
- Removal Procedure:** See the Tablet "Removal Procedure" on page 10-145-2.
- Repair Checkout:** Run the IBM 5083 Model 1x Tablet Checkout.

## 7Dx

### FRU: Cursor for the Model 11 and 12 Tablet

Additional Tests:	Run the IBM 5083 Model 1x Tablet Checkout.
Removal Procedure:	See the Tablet "Removal Procedure" on page 10-145-2.
Repair Checkout:	Run the IBM 5083 Model 1x Tablet Checkout.

## 7Ex

### FRU: IBM 5083 Model 11 Tablet

Additional Tests:	Run the IBM 5083 Model 1x Tablet Checkout.
Removal Procedure:	See the Tablet "Removal Procedure" on page 10-145-2.
Repair Checkout:	Run the IBM 5083 Model 1x Tablet Checkout.

## 80x

### FRU: IBM 5083 Model 12 Tablet

Additional Tests:	Run the IBM 5083 Model 1x Tablet Checkout.
Removal Procedure:	See the Tablet "Removal Procedure" on page 10-145-2.
Repair Checkout:	Run the IBM 5083 Model 1x Tablet Checkout.

**81x**

**FRU: IBM 6157 Streaming Tape Drive**

- Additional Tests:** Run the IBM 6157 Streaming Tape Drive Checkout.
- Removal Procedure:** See Attached Device Removal in Section 4.
- Repair Checkout:** Run the IBM 6157 Streaming Tape Drive Checkout.

**82x**

**FRU: RT PC ESDI Magnetic Media Adapter**

- Additional Tests:** None
- Removal Procedure:** See Adapter Removal in Section 4.
- Repair Checkout:** If your SRN also contains an SRA number of 98A, each fixed disk attached to this adapter must be formatted again.
- Note:** This destroys all data recorded on the fixed disk.
- To format the fixed disk, use the Format Fixed-Disk utility. If needed, see Section 2.
- Run the System Checkout.



## 84x

### FRU: RT PC Processor Board

Additional Tests: None

Removal Procedure: See Processor, Floating-Point, or System Memory Removal in Section 4.

Repair Checkout: Run the System Checkout.

## 85x

### FRU: RT PC Streaming Tape Drive Adapter

Additional Tests: Run the IBM 6157 Streaming Tape Drive Checkout.

Removal Procedure: See Adapter Removal in Section 4.

Repair Checkout: Run the IBM 6157 Streaming Tape Drive Checkout.

**86x**

**FRU: RT PC Extended ESDI Magnetic Media Adapter**

**Additional Tests:** None

**Removal Procedure:** See Adapter Removal in Section 4.

**Repair Checkout:** If your SRN also contains an SRA number of 98A, each fixed disk attached to this adapter must be formatted again.

**Note:** This destroys all data recorded on the fixed disk.

To format the fixed disk, use the Format Fixed-Disk utility. If needed, see Section 2.

Run the System Checkout.

**87x**

**FRU: Keylock**

**Additional Tests:** None

**Removal Procedure:** See Keylock Removal in Section 4.

**Repair Checkout:** Run the System Checkout.

**88x**

**FRU: Power Supply**

Do not return to the Start of Call PIC, go to "Power Supply PIC 8800" on page 3-8800-1.

**8Ax**

**FRU: Stylus for the Model 1 Tablet**

Additional Tests: Run the IBM 5083 Model 1x Tablet Checkout.

Removal Procedure: See the Tablet "Removal Procedure" on page 10-145-2.

Repair Checkout: Run the IBM 5083 Model 1x Tablet Checkout.

**8Bx**

**FRU: Cursor for the Model 1 Tablet**

Additional Tests: Run the IBM 5083 Model 1x Tablet Checkout.

Removal Procedure: See the Tablet "Removal Procedure" on page 10-145-2.

Repair Checkout: Run the IBM 5083 Model 1x Tablet Checkout.



**8Cx**

**FRU: IBM 5083 Model 1 Tablet**

**Additional Tests:** Run the IBM 5083 Model 1x Tablet Checkout.

**Removal Procedure:** See the Tablet "Removal Procedure" on page 10-145-2.

**Repair Checkout:** Run the IBM 5083 Model 1x Tablet Checkout.

**8Dx**

**Network Problem**

This SRA number indicates that there may be a problem with the Network.

**8Ex**

**FRU: Advanced Processor Board**

**Additional Tests:** None

**Removal Procedure:** See Processor, Floating-Point, or System Memory Removal in Section 4.

**Repair Checkout:** Run the System Checkout.

**8Fx**

**SCSI Bus Problem**

**Additional Tests:** Run the RT PC SCSI Adapter Checkout to isolate the problem to a device on the SCSI bus.

**Removal Procedure:** None

**Repair Checkout:** Run the RT PC SCSI Adapter Checkout.

**91x**

**FRU: Attached Device**

The device attached to the port indicated by the x in the 91x SRA may be failing, however this documentation does not support the device.

If the device is serviced by an IBM Service Representative, use the service information with the device to resolve the problem.

If the device is not serviced by an IBM Service Representative, analyze any other SRA numbers in your SRN. If they do not resolve the problem, inform the customer that the problem is not in the system unit. Contact the appropriate service organization.

95x

**FRU: IBM PC Network Components**

Additional Tests: Run the IBM PC Network Link Checkout.

Removal Procedure: See the *Setup Instructions for the IBM PC Network Transformer and Translator Unit*.

Repair Checkout: Run the IBM PC Network Adapter Checkout.

981

**POST Error 03 or 05**

Do not return to the Start of Call PIC, go to "POST Errors 03 or 05 PIC 9810" on page 3-9810-1.

982

**Invalid SRA Number**

Do not return to the Start of Call PIC, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.

983

**Invalid SRA Number**

Do not return to the Start of Call PIC, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.



**984**

**POST Error 23**

Do not return to the Start of Call PIC, go to "POST Error 23 PIC 9840" on page 3-9840-1.

**985**

**Invalid SRA Number**

Do not return to the Start of Call PIC, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.

**986**

**Undetermined Problem**

Do not return to the Start of Call PIC, go to "Undetermined Problem PIC 9860" on page 3-9860-1.

**987**

**POST Error 5c**

Do not return to the Start of Call PIC, go to "POST Errors 5c PIC 9870" on page 3-9870-1.

989

**Missing Option**

This SRA number indicates that an option was not detected by the diagnostic routines. (This may be caused by incorrect switch settings. If needed, see *IBM RT PC Options Installation*.) Use the Show Installed Options Utility to display the options installed. Find the options that are not being detected. One of the undetected options is defective. Exchange the undetected option, cable attached to the undetected option, or the adapter for the undetected option until the defective component is isolated.

Additional Tests:       None

Removal Procedure:   See the procedure for the defective component.

Repair Checkout:       Run the System Checkout or the checkout for the device.

98A

**Format Fixed Disk**

Analyze the SRA number for the fixed-disk drive and diskette adapter in this SRN first, because this SRA number indicates that some of the fixed disks must be formatted again.

All of the fixed disks attached to the fixed-disk and diskette drive adapter identified by another SRA number within this SRN, must be formatted after the adapter is exchanged. Go to the SRA number for the fixed-disk and diskette drive adapter identified in the SRN.

## 98B

### Compatibility Problem

This SRA number indicates that there is a compatibility problem between some of the system components. Look at the FRU indicated by the next SRA after the 98B. That FRU is incompatible with some other system component. For more information, see the IBM 6100 Engineering Change Announcements (ECAs).

## 991

### Obvious System Unit Problem

Find the correct removal procedure in Section 4, then exchange the FRU. Run System Checkout after exchanging the FRU.

## A1x

### FRU: Fixed-disk and Diskette Drive Cables A - D

Additional Tests: Run the Diskette Drive(s) Checkout.

Removal Procedure: See Adapter Removal in Section 4.

Repair Checkout: Run the Fixed-Disk Drive(s) and Media Checkout and the Diskette Drive(s) Checkout.



## A2x

### FRU: Fixed-Disk Drive E Cables

Additional Tests: None

Removal Procedure: See Adapter Removal in Section 4.

Repair Checkout: Run the Fixed-Disk Drive(s) and Media Checkout.

## A5x

### FRU: External Power Cable

This SRA number is generated from an error log entry. There may be an intermittent problem with the external power cable. Check the external power cable for damage.

Additional Tests: None

Removal Procedure: None

Repair Checkout: Run the System Checkout

## A6x

### FRU: IBM PC Network Cable

- Additional Tests:** Run the IBM PC Network Link Checkout
- Removal Procedure:** See the *Setup Instructions for the IBM PC Network Short, Medium, and Long Distance Kits*.
- Repair Checkout:** Run the IBM PC Network Adapter Checkout.

## A7x

### FRU: RT PC Modem Cable – RS-232C (10 PIN)

- Additional Tests:** Run the RT PC 4-Port Asynchronous RS-232C Adapter Checkout.
- Removal Procedure:** See Adapter Removal in Section 4.
- Repair Checkout:** Run the RT PC 4-Port Asynchronous 232C Adapter Checkout.

## A8x

### FRU: IBM AT Modem Cable – RS232C/9 Pin

- Additional Tests:** Run the IBM AT Serial/Parallel Adapter Checkout.
- Removal Procedure:** See Adapter Removal in Section 4.
- Repair Checkout:** Run the IBM AT Serial/Parallel Adapter Checkout.

**AAx**

**FRU: Fixed-disk and Diskette Drive Cables A – E**

Additional Tests: Run the Diskette Drive(s) Checkout.

Removal Procedure: See Adapter Removal in Section 4.

Repair Checkout: Run the Fixed-Disk Drive(s) and Media Checkout and the Diskette Drive(s) Checkout.

**B1x**

**FRU: IBM Token-Ring Network RT PC Adapter Cable**

Additional Tests: None

Removal Procedure: See Adapter Removal in Section 4.

Repair Checkout: Run the Token-Ring Network RT PC Adapter Checkout

**B2x**

**FRU: IBM PC Parallel Printer Cable**

Additional Tests: None

Removal Procedure: See Adapter Removal in Section 4.

Repair Checkout: Run a customer print job.



**B3x**

**FRU: RT PC Serial Printer Cable (9 Pin)**

Additional Tests:     None

Removal Procedure:   See Adapter Removal in Section 4.

Repair Checkout:     Run a customer print job.

**B4x**

**FRU: RT PC ASCII Terminal Cable – RS-232C (10 Pin)**

Additional Tests:     None

Removal Procedure:   See Adapter Removal in Section 4.

Repair Checkout:     Run a normal customer program.

**B5x**

**FRU: RT PC ASCII Terminal Cable – RS-422A**

Additional Tests:     None

Removal Procedure:   See Adapter Removal in Section 4.

Repair Checkout:     Run a normal customer program.

**B6x**

**FRU: RT PC Serial Printer Cable (10 Pin)**

Additional Tests:       None

Removal Procedure:   See Adapter Removal in Section 4.

Repair Checkout:       Run a normal customer program.

**B7x**

**FRU: RT PC Modem Cable – RS232C (16 Pin)**

Additional Tests:       Run the RT PC Multiprotocol Adapter Checkout.

Removal Procedure:   See Adapter Removal in Section 4.

Repair Checkout:       Run the RT PC Multiprotocol Adapter Checkout.

**B8x**

**FRU: RT PC Automatic Calling Unit Cable – RS366**

Additional Tests:       Run the RT PC Multiprotocol Adapter Checkout.

Removal Procedure:   See Adapter Removal in Section 4.

Repair Checkout:       Run the RT PC Multiprotocol Adapter Checkout.

**B9x**

**FRU: RT PC Modem Cable - X.21**

**Additional Tests:** Run the RT PC Multiprotocol Adapter Checkout.

**Removal Procedure:** See Adapter Removal in Section 4.

**Repair Checkout:** Run the RT PC Multiprotocol Adapter Checkout.

**CCx**

**Software Problem**

This SRA number indicates that a software problem exists. The Advanced Diagnostic Routines can be used to ensure that no hardware problem exists.

**CDx**

**External Power Failure**

This SRA number is generated from an error log entry. There may be a problem with the external power source.



**CEx**

**DMA Channel Error**

This SRA number is generated from an error log entry. A DMA channel error occurred. The failing DMA channel should be listed in the error log entry used to generate this SRA number.

Using the error log, find the DMA channel number, then isolate the problem to a FRU that uses that DMA channel.

Run the System Checkout to check any repairs.

**CFx**

**I/O Channel Error**

This SRA number is generated from an error log entry. An I/O channel error occurred. This error can be caused by any adapter installed in the system or the system board.

Run the System Checkout to isolate the failure. If a failure is not detected, suspect any AT 512 KB Memory Expansion Options installed.

Run the System Checkout to check any repairs.

**D1x**

**Data Link Problem**

This SRA number indicates a communication link problem.

## **D2x**

### **Modem Problem**

Run the checkout for the adapter attached to the failing modem.

If the checkout ends with the message No trouble was found, go to the maintenance package for the modem. If you do not have the service responsibility for the modem, inform the customer that the modem may need servicing.

## **D3x**

### **Modem Interface Problem**

This SRA number is generated from an error log entry. There may be a problem with the interface to the modem. Either the adapter in the location indicated by the x in the SRA number or a modem attached to that adapter is failing.

Run the System Checkout to check any repairs.

## **D6x**

### **Electrostatic Discharge Problem**

This SRA number indicates that an electrostatic discharge problem may exist.

**D7x**

**Media Problem**

This SRA number is generated from an error log entry. There may be a problem with the media (diskette, tape cartridge). Try new media to isolate the problem.

**D8x**

**Autocall Interface Problem**

This SRA number is generated from an error log entry. There may be a problem with the interface to the automatic calling unit.

**F4x**

**FRU: Unidentified Processor Board**

The program detected a processor failure, however the processor board could not be identified. Look at the processor board and use the SRA number below for the processor type you have. If needed, see Section 5.

- For the Processor Board, see SRA number 84x.
- For the Advanced Processor Board, see SRA number 8Ex.



## F6x

### FRU: Unidentified Memory Option

The program detected a failure within a memory option, however the memory option type could not be determined. Look at the memory option in the slot indicated by the x in the SRA number to determine the type of memory option, then use the SRA number given below for that type. If needed, see Section 6.

- For 1MB Memory Expansion Option, use SRA number 12x.
- For 2MB Memory Expansion Option, use SRA number 15x.
- For 4MB Memory Expansion Option, use SRA number 16x.
- For 4MB Fast Memory Expansion Option, use SRA number 1Dx.
- For 8MB Fast Memory Expansion Option, use SRA number 1Ex.

If the option is not listed above, it is not supported in this manual.

## F7x

### FRU: Unidentified Drive Cable

The program detected a drive cable failure, however the cable type could not be determined. Use the SRA numbers given below.

See SRA numbers A1x and A2x.

**F8x****FRU: Unidentified Fixed-Disk and Diskette Adapter**

The program detected a failure in the adapter for the fixed-disk and diskette drives, however the type of adapter could not be determined. Look at the adapter in the slot indicated by the x in the SRA number. Determine the adapter type, then use the SRA number below for that adapter. If needed, see Section 9.

- IBM AT Fixed-Disk and Diskette Drive Adapter. See SRA number 52x.
- RT PC ESDI Magnetic Media Adapter. See SRA number 82x.
- RT PC Extended ESDI Magnetic Media Adapter. See SRA number 86x.

If the adapter for the fixed-disk and diskette drives is not listed above, it is not supported in this manual.

**F9x****Fixed-Disk Drive Problem**

See supplemental information.

**FAx****Fixed-Disk Drive Problem**

See supplemental information.

## **FBx**

### **FRU: Unidentified Fixed-Disk Drive**

The program detected a fixed-disk drive failure, however the drive type could not be determined. Look at the label on the fixed-disk drive to determine the drive type, then use the SRA number given below for that drive type. If needed, see Section 8.

- For the type R40 fixed-disk drive, see SRA number 74x.
- For the type R70 fixed-disk drive, see SRA number 70x.
- For the type E70 fixed-disk drive, see SRA number 77x.

If the drive type is not listed above, it is not supported in this manual.

## **FCx**

### **FRU: Unidentified Diskette Drive**

The program detected a diskette drive failure, however the drive type could not be determined. Look at the diskette drive to determine the drive type, then use the SRA number given below for that drive type. If needed, see Section 7.

- For the IBM AT High Capacity Diskette Drive, see SRA number 64x.
- For the IBM AT Dual-Sided Diskette Drive, see SRA number 66x.

If the drive type is not listed above, it is not supported in this manual.



---

## Problem Determination Procedure PIC 0030

Use this procedure to obtain a Service Request Number (SRN).

This procedure uses the IBM RT PC Diagnostic Diskettes and the advanced diagnostic routines to diagnose hardware problems only.

### Step 1

Check the system for the following problems:

- Damaged covers
  - Loose cables
  - Cooling fan not running
  - Broken latches, buttons, or switches
  - Any other field-replaceable unit (FRU) with physical damage.
- 

### DID YOU FIND ONE OF THE ABOVE PROBLEMS?

**YES** Do the procedure for the problem:

- The covers are damaged — exchange the cover.
- A cable is loose — tighten the cable.
- Cooling fan not running — exchange the cooling fan.
- A latch, button, or switch is broken — exchange the FRU containing the latch, button, or switch.
- A FRU is damaged — exchange the FRU.

This completes the repair.

**NO** Continue on the next page.

## Step 2

1. If attached, set the power switch on the IBM 5085 to Off.
2. Set the power switch on the system unit to Off.
3. If present, remove the write-protect tab from the diagnostic diskettes.
4. Insert the Diagnostics 1 (DIAG-1) diskette in diskette drive A and close the drive.

**Note:** You may be instructed to insert another diagnostic diskette, if so, change to the diagnostic diskette called for and continue.

5. Set the keylock to Unlock.
6. If the IBM 5085 is attached, be sure the System Diskette is in the IBM 5085, then set the power switch to On.
7. Set the power switch on the IBM RT PC System Unit and display to On.
8. Wait 4 minutes or until the DIAGNOSTIC OPERATING INSTRUCTIONS menu displays.
9. If the IBM 5085 is attached, Press and hold the Alt key and press the Sw Keybd key. This switches the keyboard to the IBM 6150. The Sw Keybd indicator should be On.

---

### IS THE TWO-DIGIT DISPLAY BLANK?

---

**NO** Go to "Step 11" on page 3-0030-11.

**YES** Continue on the next page.

**Step 3**

Look at the display screen.

**Note:** If the display is blank or too bright, check the power, brightness, and contrast controls before answering the following question.

**DIAGNOSTIC OPERATING INSTRUCTIONS**

DIAG-1

This diskette contains diagnostics and utilities for your system. You should use these procedures whenever you are having problems with your system which have not been corrected by any software application procedures available.

In general, the procedures will run automatically. However, sometimes you will be required to select options, tell the system when to continue, do simple tasks, and exchange diskettes.

Several keys are used to control the procedures:

- The Enter key continues the procedure or performs an action.
- The End key stops a test or an action.
- The F10 key returns to the previous menu
- The Escape key resets the procedures and returns to these instructions.
- The Page Down key allows a list to be scrolled forward.
- The Page Up key allows a list to be scrolled backward.
- The Backspace key allows keying errors to be corrected.

Press Enter to continue.

**ARE THE "DIAGNOSTIC OPERATING INSTRUCTIONS" DISPLAYED WITHOUT AN OBVIOUS DISPLAY PROBLEM?**

**NO** Go to "Step 17" on page 3-0030-17.

**YES** Continue on the next page.



## Step 4

Read the DIAGNOSTIC OPERATING INSTRUCTIONS, then press the Enter key.

### FUNCTION SELECTION

DIAG-1

ID	ITEM
1	Diagnostic Routines

This selection allows you to test your machine's hardware and determine if you have a hardware problem. Any problem will be indicated by a SRN (Service Request Number). The SRN will allow your service representative to quickly determine what parts are required to repair your machine.

### IS THE "FUNCTION SELECTION" MENU DISPLAYED?

**NO** Record SRN 36-780, then go to "Step 36" on page 3-0030-36.

**YES** Continue on the next page.

**Step 5**

Choose the Advanced Diagnostic Routines.

**ADVANCED DIAGNOSTIC SELECTION**

DIAG-1

The System Checkout Option will test all functions that do not require you to do anything. The other options allow you to test only that option. An \* in front of the ID shows that the test has been run.

Choose the test you would like to run.

ID	ITEM
*1	System Checkout
2	Keyboard Checkout
3	Display Checkout
4	Diskette Drive(s) Checkout
5	Fixed-disk Drive(s) and Media Checkout
6	Serial Ports S1 and S2 Checkout
7	IBM AT Serial/Parallel Adapter 1 in Slot X Checkout
8	RT PC 4 Port Asynchronous RS232C Adapter 1 in Slot X Checkout
9	RT PC 4 Port Asynchronous RS232C Adapter 2 in Slot X Checkout
10	RT PC Floating-Point Accelerator Checkout
99	Exit Diagnostic Routines

To see additional items in the list, use Page Up and Page Down.  
To choose an item, type its ID and press Enter: \_

**DID THE "ADVANCED DIAGNOSTIC SELECTION" MENU DISPLAY?**

**YES** Go to "Step 10" on page 3-0030-10.

**NO** Continue on the next page.

## Step 6

Look at the displayed information.

---

TEST OPTION	DIAG-1
The following option was detected previously by the diagnostics, but is now undetected.	
- Option	
Has the option been removed from the system or moved to another slot?	
<u>ID</u>	<u>ITEM</u>

### DID THE "TEST OPTION" MENU DISPLAY?

**NO** Go to "Step 8" on page 3-0030-8.

**YES** Continue on the next page.



**Step 7**

The TEST OPTION menu displays because the configuration record stored on the fixed disk contains an option that the programs did not sense during POST. The option listed in the TEST OPTION menu was not sensed.

<b>TEST OPTION</b>	DIAG-1
The following option was detected previously by the diagnostics, but is now undetected.	
- Option	
Has the option been removed from the system or moved to another slot?	
<u>ID</u>	<u>ITEM</u>

**HAS THE OPTION LISTED IN THE "TEST OPTION" MENU BEEN REMOVED FROM THE SYSTEM OR MOVED TO ANOTHER SLOT?**

- YES** Choose "The option has been removed from the system or moved to another slot". If the TEST OPTION menu displays, repeat this step. Continue on the next page when another menu displays.
- NO** Choose "The option has not been removed from the system or moved to another slot". If the TEST OPTION menu displays, repeat this step. Go to "Step 36" on page 3-0030-36 when you get an SRN.

## Step 8

Look at the displayed information.

---

### DIAGNOSTIC TEST LIST

DIAG-1

The following options will be tested by the Diagnostic Routines.

- Slot B - RT PC Floating Point Accelerator
- Slot 1 - IBM AT Fixed-Disk and Diskette Drive Adapter

### DID THE "DIAGNOSTIC TEST LIST" MENU DISPLAY?

| YES Continue on the next page.

| NO Record SRN 36-780, then go to "Step 36" on page 3-0030-36.

## Step 9

Follow the displayed instructions until a service request number or the  
**ADVANCED DIAGNOSTIC SELECTION** menu displays.

---

### **DID A SERVICE REQUEST NUMBER DISPLAY?**

**YES**    Go to "Step 36" on page 3-0030-36.

**NO**     Continue on the next page.



## Step 10

### Notes:

1. If the test does not complete or an unexpected error occurs (such as the system loops or hangs, the Diagnostic Error message displays, anything displays in the two-digit display, the keyboard does not respond, or you cannot end a test), go to "Undetermined Problem PIC 9860" on page 3-9860-1.
2. If your system contains an option not listed on the DIAGNOSTIC SELECTION menu, look for a supplemental diagnostic information.

Run the checkout routines for all areas of the system. Start with the areas you suspect are failing. Record the result of each test. If any test results in an SRN, stop testing and answer the question below.

THERE IS A HARDWARE PROBLEM IN YOUR MACHINE.

DIAG-2

The Service Request Number is:

13-521-668

WRITE.....down the above number.

RETURN.....to the Hardware Maintenance and Service Manual.

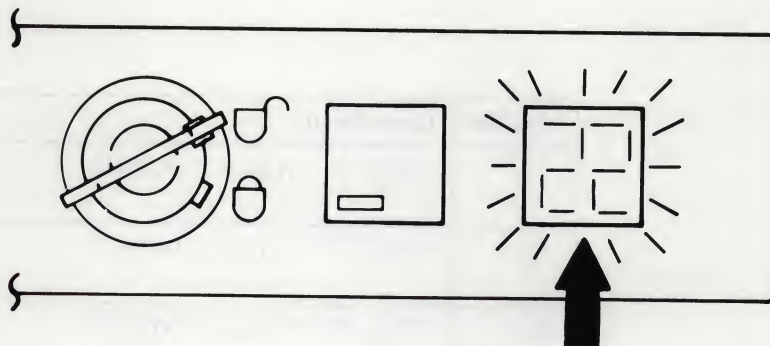
### DID ANY TEST RESULT IN A SERVICE REQUEST NUMBER?

**YES**    Go to "Step 36" on page 3-0030-36.

**NO**     Go to "Step 30" on page 3-0030-30.

## Step 11

Look at the two-digit display.



### IS THE TWO-DIGIT DISPLAY FLASHING?

**YES** Go to "Step 23" on page 3-0030-23.

**NO** Continue on the next page.

## Step 12

Look for the number displayed in the two-digit display in the following table.

---

Number	Go to Step
22	"Step 16" on page 3-0030-16
81	"Step 27" on page 3-0030-27
94	"Step 26" on page 3-0030-26
99	"Step 15" on page 3-0030-15

**DID YOU FIND THE NUMBER IN THE TABLE?**

---

**YES**    Go to the step listed.

**NO**    Continue on the next page.



---

**Step 13**

Look at the display.

---

**DIAGNOSTIC OPERATING INSTRUCTIONS**

DIAG-1

This diskette contains diagnostics and utilities for your system. You should use these procedures whenever you are having problems with your system which have not been corrected by any software application procedures available.

In general, the procedures will run automatically. However, sometimes you will be required to select options, tell the system when to continue, do simple tasks, and exchange diskettes.

Several keys are used to control the procedures:

- The Enter key continues the procedure or performs an action.
- The End key stops a test or an action.
- The F10 key returns to the previous menu
- The Escape key resets the procedures and returns to these instructions.
- The Page Down key allows a list to be scrolled forward.
- The Page Up key allows a list to be scrolled backward.
- The Backspace key allows keying errors to be corrected.

Press Enter to continue.

---

**ARE THE "DIAGNOSTIC OPERATING INSTRUCTIONS"  
DISPLAYED?**

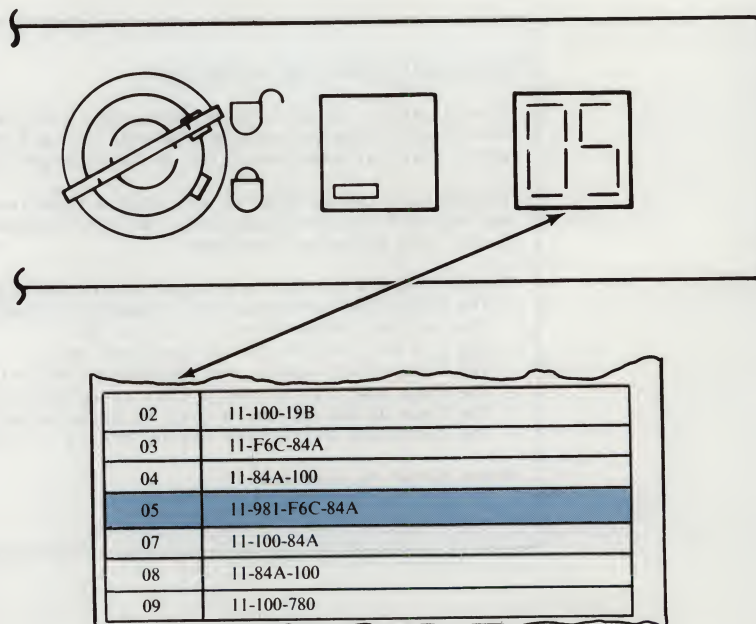
---

**YES**     Record SRN 11-630-84A, then go to "Step 36" on page 3-0030-36.

**NO**      Continue on the next page.

## Step 14

Find the POST number displayed in the two-digit display in the "POST Indicator Chart PIC 0040" on page 3-0040-1, then return here to answer the following question.

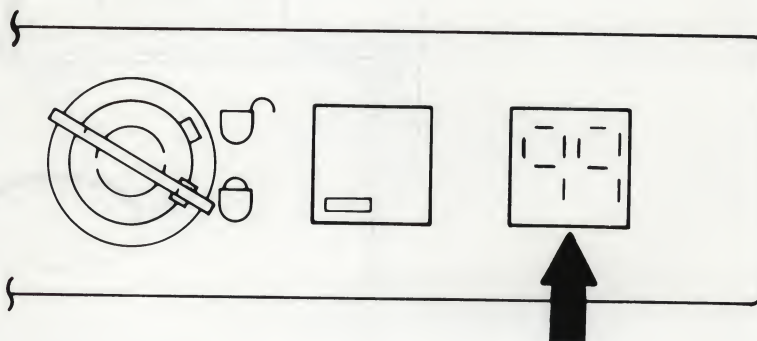


### DID YOU FIND THE NUMBER IN THE CHART?

- NO** Record SRN 16-84A-630-100, then go to "Step 36" on page 3-0030-36.
- YES** Record the SRN for the number, then go to "Step 36" on page 3-0030-36.

## Step 15

The number 99 in the two-digit display indicates the keylock is in the Locked position. Look at the keylock.



### IS THE KEYLOCK IN THE LOCKED POSITION?

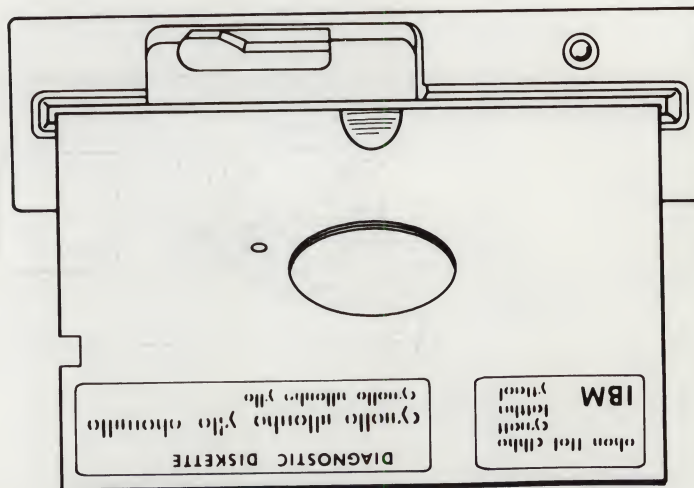
- NO** Record SRN 11-630-100, then go to "Step 36" on page 3-0030-36.
- YES** Set the keylock to Unlock, then go to "Step 2" on page 3-0030-2.



## Step 16

Be sure the Diagnostics 1 (DIAG-1) diskette is inserted correctly in the diskette drive.

---



### DID YOU FIND A PROBLEM?

---

**YES** Go to "Step 2" on page 3-0030-2.

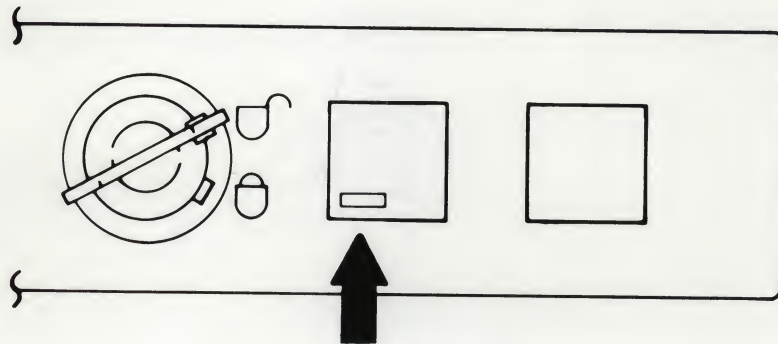
**NO** Record SRN 16-F80-64A-A10, then go to "Step 36" on page 3-0030-36.

---

**Step 17**

Look at the Power-On indicator on the operator panel.

---



---

**IS THE POWER-ON INDICATOR ON?**

---

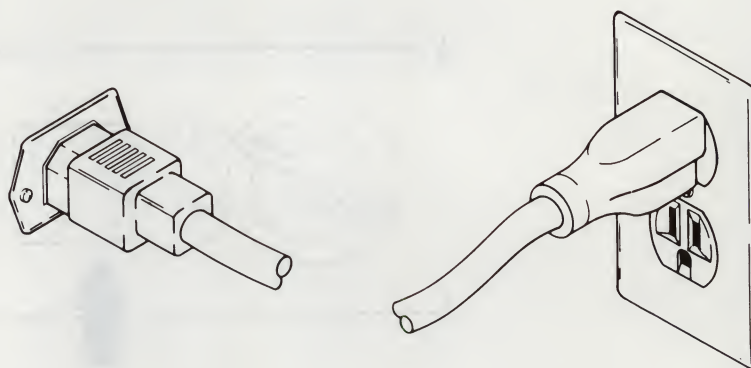
**YES**    Go to "Step 19" on page 3-0030-19.

**NO**    Continue on the next page.

## Step 18

Be sure the external power cable to the system unit is plugged into the system unit and an outlet and that the outlet has correct voltage. If needed, see Section 5.

---



### DID YOU FIND A PROBLEM?

---

**YES** If the outlet does not have correct voltage have the customer correct the problem, otherwise, plug the external power cable in.

This completes the repair.

**NO** Record SRN 16-880, then go to "Step 2" on page 3-8800-2.



## Step 19

Some problems prevent the diagnostic diskette from loading and the *Operating System* loads instead.

Look at the display and determine if a screen from the customer's operating system is displayed. If needed, ask the customer for assistance in determining the above condition.

---

**IS A SCREEN FROM THE CUSTOMER'S OPERATING SYSTEM  
DISPLAYED?**

---

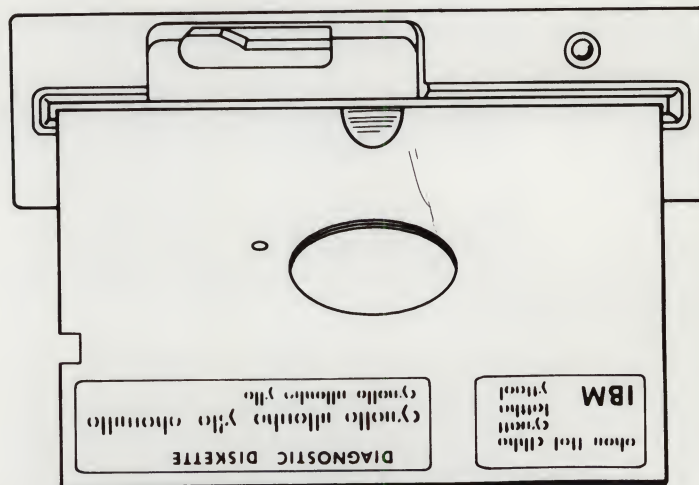
**NO**      Go to "Step 21" on page 3-0030-21.

**YES**      Continue on the next page.

## Step 20

Be sure the Diagnostics 1 (DIAG-1) diskette is correctly inserted in the diskette drive.

---



### DID YOU FIND A PROBLEM?

**YES** Go to "Step 2" on page 3-0030-2.

**NO** Record SRN 16-64A-F80-A10, then go to "Step 36" on page 3-0030-36.

## Step 21

Look at the upper left corner of the display.

---

### IS "DCP" DISPLAYED THERE?

---

**YES** Record SRN 16-64A-F80-A10, then go to "Step 36" on page 3-0030-36.

**Note:** A defective diagnostic diskette can cause this problem also.

**NO** Continue on the next page.



**Step 22**

Look at the display attached to your system. If needed, see Section 11.

Display Type	Go to PIC
IBM 5151 Personal Computer Display	"IBM 5151 Personal Computer Display PIC 5400" on page 3-5400-1
IBM 5154 Enhanced Color Display	"IBM 5154 Enhanced Color Graphics Display PIC 5800" on page 3-5800-1
IBM 6153 Advanced Monochrome Graphics Display	"IBM 6153 Advanced Monochrome Graphics Display PIC 6000" on page 3-6000-1
IBM 6154 Advanced Color Graphics Display	"IBM 6154 Advanced Color Display PIC 5900" on page 3-5900-1
IBM 6155 Extended Monochrome Graphics Display	"IBM 6155 Extended Monochrome Graphics Display PIC 6200" on page 3-6200-1
IBM 5081 Display	"IBM 5081 Display PIC 6100" on page 3-6100-1

**IS THE DISPLAY ATTACHED TO YOUR SYSTEM LISTED IN THE TABLE?**

**YES**    Go to the PIC for your display.

**NO**    The display is not supported by this manual, go to the service documentation for the attached display.

---

**Step 23**

This step is for flashing numbers only.

Look for the number displayed in the two-digit display in the following table.

---

Number	Go to Step
02	"Step 24" on page 3-0030-24
30	"Step 24" on page 3-0030-24
99	"Step 25" on page 3-0030-25

---

**DID YOU FIND THE NUMBER IN THE TABLE?**

---

**YES**    Go to the step listed.

**NO**     Go to "Step 25" on page 3-0030-25.

## Step 24

The Diagnostics 1 (DIAG-1) diskette may be defective. Try a new Diagnostics 1 (DIAG-1) diskette.

If the new Diagnostics 1 (DIAG-1) diskette does not work, record SRN 16-64A-F80 and go to "Step 36" on page 3-0030-36.



## Step 25

A program or machine check occurred. Go to "Undetermined Problem PIC 9860" on page 3-9860-1.

Step	Condition	Action
1	Program or machine check occurred.	Go to "Undetermined Problem PIC 9860" on page 3-9860-1.
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
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90		
91		
92		
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94		
95		
96		
97		
98		
99		
100		

**Step 26**

Determine the type of display adapter the display is attached to. Look for the adapter type in the table below.

Type Display Adapter	SRN
Enhanced Graphics Adapter	12-410
Advanced Monochrome Graphics Display Adapter	12-430
IBM Monochrome Display and Printer Adapter	12-490
Advanced Color Graphics Display Adapter	12-450
Extended Monochrome Graphics Display Adapter	12-470
IBM Megapel Display Adapter	12-4B0

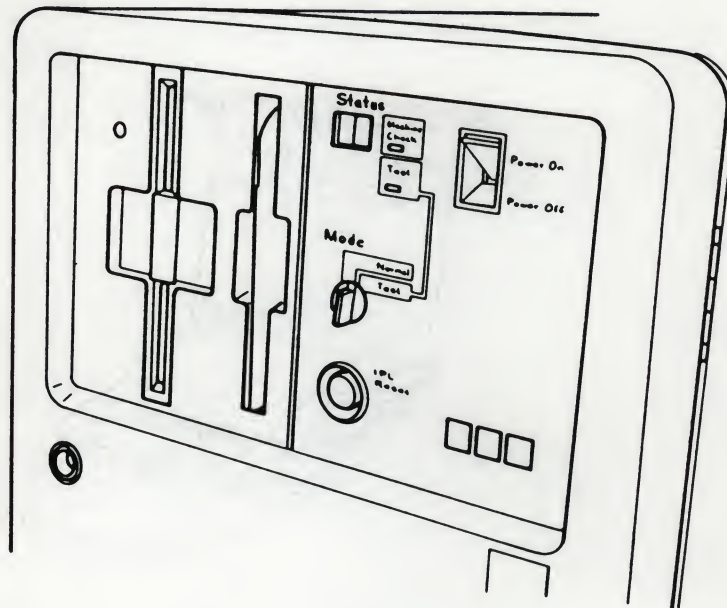
**DID YOU FIND THE ADAPTER IN THE TABLE?**

**YES** Record the SRN, then go to "Step 36" on page 3-0030-36.

**NO** See "Loading Additional Device Drivers" on page 2-9, then go to "Step 3" on page 3-0030-3. If you don't have an additional device driver diskette, then the display adapter is not supported in this documentation.

## Step 27

Look at the cables attached to your system unit.



### IS AN IBM 5085 CONNECTED TO YOUR SYSTEM UNIT?

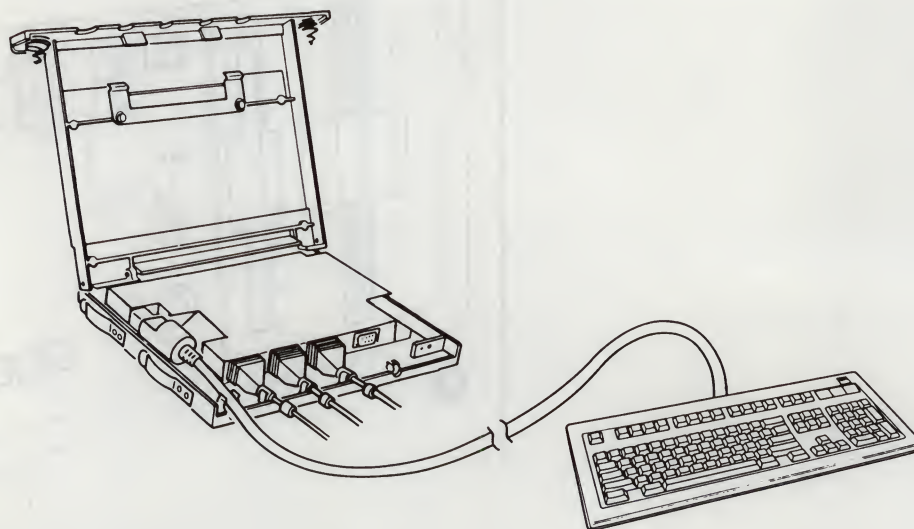
- NO** Record SRN 32-780, then go to "Step 36" on page 3-0030-36.
- YES** Continue on the next page.



## Step 28

Be sure the keyboard is connected to the Peripheral Connection Assembly (PCA) on the IBM 5085. The PCA is installed in the base of the IBM 5081 Display. If needed, see the *IBM 5085 Graphics Processor Maintenance Information Manual*.

---



---

### DID YOU FIND A PROBLEM?

---

**YES** This completes the repair.

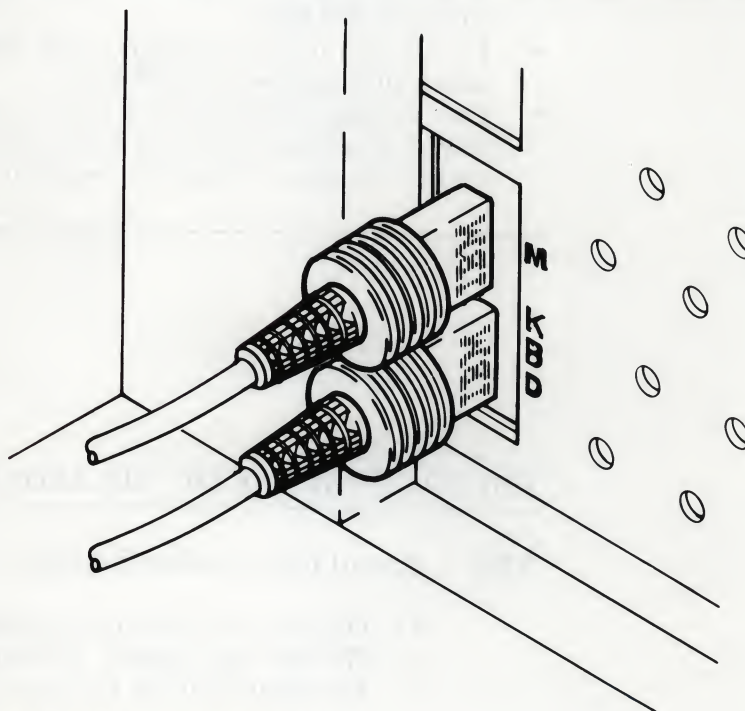
**NO** Continue on the next page.

---

**Step 29**

Be sure the Y cable is correctly connected to the PCA on the IBM 5085 and to the M (mouse) and KBD (keyboard) connectors on the IBM 6150. The PCA is installed in the base of the IBM 5081. If needed, see the *IBM 5085 Graphics Processor Maintenance Information Manual*.

---



---

**DID YOU FIND A PROBLEM?**

---

**YES** This completes the repair.

**NO** Go to the maintenance instructions for the IBM 5085.

## Step 30

The checkout routines ran correctly.

Each of the following problems are related to particular SRNs. Check the system for the following problems:

- The indicators on the keyboard are not working (check during power-on self-test).
  - The speaker in the keyboard is not working or sounds continually (check during power-on self-test).
  - The two-digit display fails to display correctly (check at the start of power-on self-test). The power-on self-test program displays 88 at the start of the test to check the two-digit display.
- 

### DID YOU FIND ONE OF THE ABOVE PROBLEMS?

**YES** Record the corresponding SRN for the problem.

- The indicators on the keyboard are failing, record 16-780.
- The two-digit display is failing, record 16-630-84A.
- The speaker in the keyboard is failing, record 16-780-100.

**Note:** If an IBM 5085 is attached, it can also cause a speaker problem.

Go to "Step 36" on page 3-0030-36.

**NO** Continue on the next page.



**Step 31**

A loud noise can be caused by moving parts in the system unit.

---

**DID THE CUSTOMER REPORT A NOISE PROBLEM?**

**YES**    Go to "Noise Problem PIC 0050" on page 3-0050-1.

**NO**    Continue on the next page.

## Step 32

The problem may be an incorrect switch or jumper setting on an option, adapter, fixed-disk drive, or diskette drive. This may occur in a new installation or after a new option is installed. Ask the customer if this is a new installation or if a new option was added to the system.

---

### **DO YOU SUSPECT A SWITCH OR JUMPER SETTING IS THE PROBLEM?**

---

**YES** Switch and jumper settings depend upon the system configuration. The *Options Installation* manual shows the switch settings for different configurations. Use the *Options Installation* manual to check the jumper and switch settings on your system, then continue on the next page.

**NO** Go to "Step 34" on page 3-0030-34.

### Step 33

After checking the switch and jumper settings on your system, answer the following question.

---

#### **DID YOU FIND A PROBLEM?**

**YES**    Run the System Checkout to verify the repair.

          This completes the repair.

**NO**     Continue on the next page.



### Step 34

Some problems occur intermittently.

---

#### IS THIS PROBLEM FAILING INTERMITTENTLY?

- YES**    Go to "Intermittent Problem PIC 0090" on page 3-0090-1.
- NO**     Continue on the next page.

## Step 35

Some problems may not be detected by the diagnostic routines but still fail when running a certain application program.

---

### **DOES THIS PROBLEM OCCUR ONLY WHEN RUNNING A CERTAIN APPLICATION PROGRAM?**

---

**YES**    Go to "Application Only Problems PIC 0080" on page 3-0080-1.

**NO**     No trouble was found. This completes the repair.

### Step 36

You may have already analyzed all the SRAs in the SRN using PIC 0010.

---

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

**HAVE YOU ANALYZED EACH OF THE SRAs IN THE SRN  
USING PIC 0010?**

---

**YES**    Go to "Unresolved Problem PIC 0060" on page 3-0060-1.

**NO**    Go to "Step 3" on page 3-0010-4 and analyze the new SRAs.



## POST Indicator Chart PIC 0040

**Note:** This chart is for *steady* numbers only. For numbers that are flashing, go to "Undetermined Problem PIC 9860" on page 3-9860-1.

Do not use this PIC alone. Start at the "Start of Call PIC 0010" on page 3-0010-1.

Number	Service Request Number or Action
00	11-100-84A-490
01	11-84A
02	11-100-19B
03	11-F6C-84A
04	11-84A-100
05	11-981-F6C-84A
07	11-100-84A
08	11-84A-100
09	11-100-780
0c	11-100-8EA-490
10	11-100-84A
11	11-100
12	11-100
14	11-F80
1c	11-8EA
22	11-F80-64A-A10
23	11-984-F80-100

Number	Service Request Number or Action
25	Software problem during IPL. Power off to clear the problem.
27	11-F6C
30	12-490
31	12-410
32	12-430
33	12-450
34	12-470
35	12-FBC-F80-A10
36	12-FBD-F81-A10
37	12-FBE-F81-A20
39	12-100-F80
3c	11-F6C-8EA
40	12-F80-100
43	12-200-240
44	12-19B
45	12-490
46	12-340
47	12-1DC
48	12-1DD
4c	11-8EA-100
50	12-310
51	12-230

---

Number	Service Request Number or Action
52	12-5B0
53	12-350
54	12-230
55	12-350
56	12-390
57	12-390
58	12-320
59	12-3A0
5c	11-F6C-8EA
60	12-280
61	12-380
62	12-400
65	12-4A0
66	12-4B0
67	12-1CB
68	12-8EA
69	12-8EA
71	12-15C
72	12-12C
73	12-16C
74	12-1EC
76	12-12D
77	12-15D
78	12-16D



Number	Service Request Number or Action
79	12-1ED
7c	11-100-8EA
80	12-100
81	32-780
82	12-100
84	12-210
85	12-800
86	12-300
88	11-F4A-100
89	12-F4A-100
8c	11-8EA-100
90	12-850
93	12-64A-F80 (First, be sure the write protect tab is not on the diagnostic diskette.)
94	See "Loading Additional Device Drivers" on page 2-8, then use "Problem Determination Procedure PIC 0030" on page 3-0030-1.
95	12-F7x-FBx-F8x
99	The keylock is set to On.

---

## Noise Problem PIC 0050

Use this PIC to find the FRU that is causing a loud noise.

### Step 1

The device causing the noise can be identified by removing devices from the system unit.

---

---

### IS THE NOISE COMING FROM THE SYSTEM UNIT?

---

**NO**      Go to "Step 5" on page 3-0050-5.

**YES**      Continue on the next page.

---

## Step 2

The diskette drive, fixed-disk drive and cooling fan have moving parts and can cause noise problems.

---

### CAN YOU IDENTIFY WHICH FRU IS CAUSING THE NOISE?

**YES** Do the following:

1. Exchange the FRU.
2. Run the System Checkout.
3. This completes the repair.

**NO** Continue on the next page.



---

### Step 3

1. Set the power switch on the system unit to Off.
  2. Do the "Top Cover Removal" on page 4-12.
  3. Disconnect the power connectors to the diskette drive and fixed-disk drive.
  4. Set the power switch on the system unit to On.
- 

### **DO YOU STILL HAVE A NOISE PROBLEM?**

**YES**     Do the following:

1. Exchange the cooling fan.
2. Connect the power connectors to the drives.
3. Run the System Checkout.
4. This completes the repair.

**NO**     Continue on the next page.

---

## Step 4

Either the diskette drive or the fixed-disk drive is causing the problem.

1. Set the power switch on the system unit to Off.
  2. Connect the fixed-disk drive.
  3. Set the power switch to On.
- 

## **DO YOU STILL HAVE A NOISE PROBLEM?**

**YES**     The fixed-disk drive is failing.

1. Connect the diskette drive.
2. Exchange the fixed-disk drive.
3. Run the System Checkout.
4. This completes the repair.

**NO**     The diskette drive is failing.

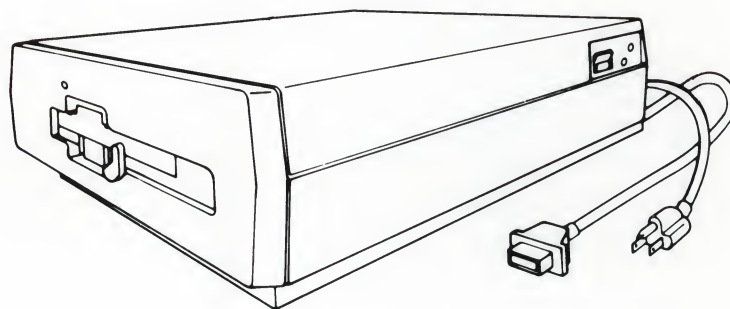
1. Exchange the diskette drive.
2. Run the System Checkout.
3. This completes the repair.

---

## Step 5

Listen to the tape drive.

---



---

### IS THE NOISE COMING FROM THE TAPE DRIVE?

---

**YES**     The tape drive is causing the noise.

1. Exchange the tape drive.
2. Run the System Checkout.
3. This completes the repair.

**NO**     Follow the procedures for servicing the device which has the noise problem.





## Unresolved Problem PIC 0060

Use this PIC for problems that still fail after all of the FRUs in the SRN have been exchanged.

**Note:** If the IBM 6150 is attached to an IBM 5085, disconnect the cable that attaches the IBM 5085 to the keyboard (KBD) and mouse (M) connectors at the IBM 6150 end. Connect the keyboard and mouse or tablet directly to the IBM 6150 connectors. Try the failing procedure. If the system does not fail, use the maintenance procedures for the IBM 5085 to isolate the problem.

### | Step 1

| This problem may be caused by a defective cable. Look at the SRN.  
|

| 4. Write the Service Request Number here:

| 13 - 821 - 741 - \_\_\_\_\_ - \_\_\_\_\_  
|

| **DOES THE SRN CONTAIN THE SRA NUMBERS OF TWO FRUs**  
| **THAT ARE CONNECTED BY A CABLE THAT HAS NOT BEEN**  
| **EXCHANGED (such as a fixed-disk adapter and the fixed-disk drive)?**

| **NO** Go to "Step 3" on page 3-0060-3.

| **YES** Continue on the next page.

**Step 2**

1. Exchange the cable.
  2. Try the failing operation again.
- 

**DOES THE SYSTEM STILL FAIL?**

---

**NO** This completes the repair.

**YES** Continue on the next page.



---

**Step 3**

Look at the SRN.

---

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

---

**IS THE PROCEDURE NUMBER A “2” OR A “7”?**

---

**NO**      Go to “Step 6” on page 3-0060-6.

**YES**      Continue on the next page.

#### Step 4

The system board may be the problem.

---



---

#### **HAS THE SYSTEM BOARD BEEN REPLACED?**

---

**YES** Go to “Step 6” on page 3-0060-6.

**NO** Continue on the next page.

## Step 5

1. Exchange the System Board.
  2. Run System Checkout.
- 

TESTING COMPLETE

DIAG-2

No trouble was found.

Press Enter to continue.

**WERE YOU ABLE TO LOAD AND RUN SYSTEM CHECKOUT  
AND DID THE "NO TROUBLE WAS FOUND" MESSAGE  
DISPLAY?**

---

**YES** This completes the repair.

**NO** Go to "Step 19" on page 3-0060-20.



## Step 6

Look at the SRN.

---

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

**IS THE PROCEDURE NUMBER A "1"?**

---

**NO** Go to "Step 9" on page 3-0060-9.

**YES** Continue on the next page.

---

**Step 7**

A procedure number of 1 indicates that the system unit failed with an error code displayed in the two-digit display.

1. Set the power switch on the system unit to Off.
  2. If needed, see Section 4 to remove the covers.
  3. If present, remove the options from slots B and D. Then, remove all of the adapters from the adapter slots (record the slot numbers).
  4. Set the power switch on the system unit to On and wait 2 minutes.
- 

---

**IS "23" DISPLAYED IN THE TWO-DIGIT DISPLAY?**

---

**NO** One of the remaining boards or options is failing. The order of most likely failure is:

1. The processor board
2. The system board
3. The memory expansion option in slot C.

Using the list above, exchange any FRU not already exchanged. To test each new FRU, set the power switch on the system unit to On and wait 2 minutes for 23 to display in the two-digit display. When 23 displays, the last FRU exchanged is the failing FRU.

Go to "Step 25" on page 3-0060-26.

**YES** Continue on the next page.

## Step 8

One of the options or adapters you removed is failing.

1. Set the power switch on the system unit to Off.
  2. Install one of the removed options or adapters. Use the following order, slots C, D, B, then the adapters in the other slots, being sure that the fixed-disk and diskette drive adapter is the last adapter installed.
  3. Set the power switch on the system unit to On and wait 2 minutes, then answer the following question.
- 

### **IS "23" DISPLAYED IN THE TWO-DIGIT DISPLAY?**

---

**YES** Repeat the above steps.

**NO** The last option or adapter installed or a FRU attached to it is failing. Use the removal and replacement procedures in the section that applies to the FRU and exchange it. Go to "Step 25" on page 3-0060-26.



---

**Step 9**

Look at the SRN.

---

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

---

**IS THE PROCEDURE NUMBER A "3"?**

---

**NO**    Go to "Step 19" on page 3-0060-20.

**YES**    Continue on the next page.

**Step 10**

Look at the SRN.

---

4. Write the Service Request Number here:

13 - 234 - \_ \_ \_ \_ \_

**DOES THE SRN CONTAIN ONLY ONE SRA NUMBER?**

---

**NO** Go to "Step 13" on page 3-0060-13.

**YES** Continue on the next page.

**Step 11**

The failure may be caused by a device or adapter attached to one of the FRUs indicated by an SRA number in the SRN. For example, the SRA number may indicate a tape drive and the tape drive adapter may be the failing FRU, or the SRA number may indicate the tape drive adapter and tape drive is the failing FRU.

4. Write the Service Request Number here:

13 - 821 - 741 - \_\_\_\_\_

**DOES THE SRA NUMBER INDICATE A FRU THAT HAS A  
DEVICE OR ADAPTER ATTACHED TO IT?**

**NO**      Go to "Step 13" on page 3-0060-13.

**YES**      Continue on the next page.



**| Step 12**

- | 1. Exchange the device or adapter attached to the FRU indicated in the  
| SRA number.
- | 2. Try the failing procedure again.
- 

**| DOES THE SYSTEM STILL FAIL?**

---

| **NO** This completes the repair.

| **YES** Continue on the next page.

**Step 13**

The System Checkout routine will sometimes detect a problem that is not detected by the other diagnostics.

**ADVANCED DIAGNOSTIC SELECTION**

DIAG-1

The System Checkout Option will test all functions that do not require you to do anything. The other options allow you to test only that option.  
An \* in front of the ID shows that the test has been run.

Choose the test you would like to run.

ID ITEM

- \*1 System Checkout
- 2 Keyboard Checkout
- 3 Display Checkout
- 4 Diskette Drive(s) Checkout
- 5 Fixed-disk Drive(s) and Media Checkout
- 6 Serial Ports S1 and S2 Checkout
- 7 IBM AT Serial/Parallel Adapter 1 in Slot X Checkout
- 8 RT PC 4 Port Asynchronous RS232C Adapter 1 in Slot X Checkout
- 9 RT PC 4 Port Asynchronous RS232C Adapter 2 in Slot X Checkout
- 10 RT PC Floating-Point Accelerator Checkout
- 99 Exit Diagnostic Routines

To see additional items in the list, use Page Up and Page Down.

To choose an item, type its ID and press Enter: \_

### **HAVE YOU RUN "SYSTEM CHECKOUT" USING THE ADVANCED DIAGNOSTIC ROUTINES?**

**YES** Go to "Step 19" on page 3-0060-20.

**NO** Continue on the next page.

## Step 14

Run the System Checkout using the Advanced Diagnostic Routines.

---

**THERE IS A HARDWARE PROBLEM IN YOUR MACHINE.**

DIAG-2

The Service Request Number is:  
13-521-668

WRITE.....down the above number.  
RETURN.....to the Hardware Maintenance and Service Manual.

You may restart your system by depressing Ctrl, Alt, and Pause simultaneously.

---

**DID THE “THERE IS A HARDWARE PROBLEM IN YOUR MACHINE” SCREEN DISPLAY?**

---

**NO**      Go to “Step 16” on page 3-0060-16.

**YES**      Continue on the next page.



## Step 15

Look at the SRN.

---

THERE IS A HARDWARE PROBLEM IN YOUR MACHINE.

DIAG-2

The Service Request Number is:  
13-521-668

WRITE.....down the above number.

RETURN.....to the Hardware Maintenance and Service Manual.

You may restart your system by depressing Ctrl, Alt, and Pause simultaneously.

**DID YOU GET AN SRN THAT CONTAINS SRA NUMBERS THAT  
HAVE NOT BEEN ANALYZED?**

---

**YES**     Record the SRN, then go to "Step 3" on page 3-0010-4 and  
analyze the SRA numbers you have not analyzed.

**NO**     Go to "Step 19" on page 3-0060-20.

## Step 16

You are here because the system is failing only when a diagnostic checkout other than the System Checkout is run. The following FRUs are required to select a checkout procedure.

- The system board.
  - The processor board.
  - A memory expansion option in slot C.
  - An adapter for the diskette drive.
  - An IBM AT High Capacity Diskette Drive in drive position A.
  - A display adapter.
  - A display.
  - The cables for the diskette drive.
  - The power supply.
  - The cooling fan.
  - A keyboard.
- 

Step 16 continues on the next page.

**(Step 16 continued)**

When the FRUs listed on the previous page are installed, the following selections display on the DIAGNOSTIC SELECTION menu.

- System Checkout
  - Display Checkout
  - Diskette Drive(s) Checkout
  - Fixed-disk Drive(s) Checkout
  - Keyboard Checkout.
- 

**IS THE DIAGNOSTIC CHECKOUT THAT FAILED IN THE LIST ABOVE?**

---

**YES** Remove any FRU from the system unit that is not in the list above, then continue on the next page.

**NO** All other diagnostic checkouts relate to specific FRUs, they appear only when the FRUs are installed in the system unit.

Remove any FRU not listed above except FRUs that are related to the failing diagnostic checkout, then continue on the next page.



## Step 17

Run the diagnostic checkout that fails. The TEST OPTION and the DIAGNOSTIC TEST LIST menu will display if the configuration was changed. Follow the instructions as they display.

---

THERE IS A HARDWARE PROBLEM IN YOUR MACHINE.

DIAG-2

The Service Request Number is:  
13-521-668

WRITE.....down the above number.

RETURN.....to the Hardware Maintenance and Service Manual.

### DID THE "THERE IS A HARDWARE PROBLEM IN YOUR MACHINE" SCREEN DISPLAY?

---

**NO** One of the FRUs you removed is failing. Install the FRUs one at a time until the failing FRU is identified. Test each FRU by running the failing diagnostic checkout. The TEST OPTION and the DIAGNOSTIC TEST LIST menu will display if the configuration was changed. Follow the instructions as they display. If you identify a failing FRU, use the removal and replacement procedures in the section that applies to the FRU and exchange it, then go to "Step 25" on page 3-0060-26. If you cannot identify a failing FRU, contact your service support person.

**YES** Continue on the next page.

---

**Step 18**

One of the FRUs still installed in the system unit is failing. The following list is in the most to least likely to fail order.

If you have not exchanged it already, use the removal and replacement procedures in the section that applies to the FRU and exchange it. Test each FRU by running the failing diagnostic checkout. If you identify the failing FRU, go to "Step 25" on page 3-0060-26. If you cannot identify a failing FRU, contact your service support person.

1. FRUs required to run the failing diagnostic checkout.
2. The system board.
3. The processor board.
4. A display adapter.
5. The memory expansion option in slot C.
6. The adapter for the fixed-disk and diskette drive.
7. The power supply.
8. An IBM AT High Capacity Diskette Drive in drive position A.
9. The cables for the fixed-disk and diskette drive.
10. The cooling fan.
11. A display.
12. A keyboard.

## Step 19

The following FRUs are required to run the System Checkout. Remove any other FRUs that are installed in the system unit.

- The system board.
- The processor board.
- A memory expansion option in slot C.
- An adapter for the diskette drive.
- An IBM AT High Capacity Diskette Drive in drive position A.
- A display adapter.
- A display.
- The cables for the diskette drive.
- The power supply.
- The cooling fan.
- A keyboard.

Run the System Checkout. The TEST OPTION and the DIAGNOSTIC TEST LIST menu will display if the configuration was changed. Follow the instructions as they display.

---

### **WERE YOU ABLE TO LOAD AND RUN THE "SYSTEM CHECKOUT" AND DID THE "NO TROUBLE WAS FOUND" MESSAGE DISPLAY?**

---

**YES** One of the FRUs you removed is failing. Install the FRUs one at a time until the failing FRU is identified. Test each FRU by running the failing diagnostic checkout. The TEST OPTION and the DIAGNOSTIC TEST LIST menu will display if the configuration was changed. Follow the instructions as they display. If you identify a failing FRU, use the removal and replacement procedures in the section that applies to the FRU and exchange it, then go to "Step 25" on page 3-0060-26. If you cannot identify a failing FRU, contact your service support person.

**NO** Continue on the next page.



---

**Step 20**

One of the FRUs still installed in the system unit is failing. The most likely failing order depends on the failing area. The failing area can be related to the types of FRUs that you have exchanged that did not fix the problem. Find the area that best describes your problem in the table below, then go to that step.

---

Failing Area	Go to Step
Displays	"Step 21" on page 3-0060-22
Fixed-disk and diskette drives	"Step 22" on page 3-0060-23
Keyboard	"Step 23" on page 3-0060-24
Other or unknown area	"Step 24" on page 3-0060-25

## Step 21

The following FRUs are the most likely to cause display failures.

Exchange the FRUs that have not been exchanged in the following order. Test each FRU by running System Checkout. If you identify a failing FRU, use the removal and replacement procedures in the section that applies to the FRU and exchange it, then go to "Step 25" on page 3-0060-26. If you cannot identify a failing FRU, contact your service support person.

1. The display.
2. The display adapter.
3. The system board.
4. The processor board.
5. A memory expansion option in slot C.
6. An adapter for the fixed-disk and diskette drive.
7. The power supply.
8. The IBM AT High Capacity Diskette Drive in drive position A.
9. The cables for the fixed-disk and diskette drive.
10. The cooling fan.
11. The keyboard.

---

## Step 22

The following FRUs are the most likely to cause a failure in the fixed-disk and diskette drives.

Exchange the FRUs that have not been exchanged in the following order. Test each FRU by running System Checkout. If you identify a failing FRU, use the removal and replacement procedures in the section that applies to the FRU and exchange it, then go to "Step 25" on page 3-0060-26. If you cannot identify a failing FRU, contact your service support person.

1. An adapters for the fixed-disk and diskette drives.
2. The cables for the fixed-disk and diskette drive.
3. The IBM AT High Capacity Diskette Drive.
4. The system board.
5. The processor board.
6. The power supply.
7. The display adapter.
8. A memory expansion option in slot C.
9. The cooling fan.
10. The display.
11. The keyboard.



## Step 23

The following FRUs are the most likely to cause a keyboard failure.

Exchange the FRUs that have not been exchanged in the following order. Test each FRU by running System Checkout. If you identify a failing FRU, use the removal and replacement procedures in the section that applies to the FRU and exchange it, then go to "Step 25" on page 3-0060-26. If you cannot identify a failing FRU, contact your service support person.

1. The keyboard.
2. The system board.
3. The processor board.
4. The power supply.
5. The display adapter.
6. An adapter for the fixed-disk and diskette drive.
7. A memory expansion option in slot C.
8. The IBM AT High Capacity Diskette Drive.
9. The cables for the fixed-disk and diskette drive.
10. The cooling fan.
11. The display.

---

**Step 24**

The following FRUs are also likely to cause a failure.

Exchange the FRUs that have not been exchanged in the following order. Test each FRU by running System Checkout. If you identify a failing FRU, use the removal and replacement procedures in the section that applies to the FRU and exchange it. Go to "Step 25" on page 3-0060-26. If you cannot identify a failing FRU, contact your service support person.

1. The system board.
2. The processor board.
3. A memory expansion option in slot C.
4. An adapter for the fixed-disk and diskette drive.
5. The AT High Capacity Diskette Drive.
6. The cables for the fixed-disk and diskette drive.
7. The display adapter.
8. The power supply.
9. The cooling fan.
10. The display.
11. The keyboard.

## Step 25

1. Look at the type and slot positions you recorded, and install the boards and adapters you removed.
  2. Unplug the external power cable from the outlet.
  3. If needed, see Section 4 to install the covers.
  4. Set the power switch on the system unit to On.
  5. Follow the instructions on the menus to run the System Checkout. The TEST OPTION and the DIAGNOSTIC TEST LIST menu will display if the configuration was changed. Follow the instructions as they display. If needed, see page 2-17.
- 

### **WERE YOU ABLE TO LOAD AND RUN THE "SYSTEM CHECKOUT" AND DID THE "NO TROUBLE WAS FOUND" MESSAGE DISPLAY?**

---

- NO** If the same failure occurs, contact your service support person, otherwise, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.
- YES** This completes the repair.



---

## **Application Only Problems PIC 0080**

Use this PIC to find problems that fail only when an application program is running and the diagnostic programs run without a failure.

### **Step 1**

The AIX<sup>1</sup> Operating System provides an error logging function.

---

### **IS THE CUSTOMER USING THE "AIX OPERATING SYSTEM"?**

**NO**      Go to "Step 8" on page 3-0080-8.

**YES**      Continue on the next page.

---

<sup>1</sup>      Trademark of IBM

---

## Step 2

1. Record the time.
  2. Ask the operator to load the operating system and turn on the Error Log. The command to turn on the Error Log is:  
  
**/usr/lib/errdemon**
  3. Ask the operator to run the failing application program.
  4. After a failure occurs, ask the operator to print a Summary Report of the permanent errors starting at the time you recorded. The command is (where **MMddhhmmyy** is month, day, hour, minute, year):  
  
**errpt -d t01 -sMMddhhmmyy | print**
  5. Look at the printed error log. If needed, see Appendix C.
- 

### **ARE THERE ANY ERRORS LISTED?**

**NO**      Go to "Step 8" on page 3-0080-8.

**YES**      Continue on the next page.

---

### Step 3

Look at the printed Summary Report.

---

#### **ARE THERE ANY HARDWARE ERRORS LISTED?**

- NO**      Have the customer follow the procedures for reporting the types of errors listed.
- YES**      Continue on the next page.



---

#### Step 4

Ask the operator to print a Detail Report for the hardware errors listed.  
The command is (where **MMddhhmmyy** is month, day, hour, minute, year):

```
errpt -a -d t01 -d h00 -sMMddhhmmyy | print
```

---

#### **ARE THE HARDWARE ERRORS RELATED TO THE HARDWARE YOU SERVICE?**

---

- NO** Have the customer follow the procedures for resolving the problems listed.
- YES** Continue on the next page.

---

## Step 5

1. Record the SRNs for the errors that are related to the hardware you service.
  2. Look up the FRUs that correspond to the SRAs in each SRN.
  3. Use the removal and replacement procedures in the section that applies to the FRU and exchange the FRU that corresponds to the first SRA in the SRN.
  4. Ask the customer to run the failing application again.
- 

### **DID THE SAME FAILURE OCCUR?**

- NO**      This completes the repair.
- YES**      Continue on the next page.

---

## Step 6

One of the FRUs that correspond to the SRAs in the SRN should fix the problem.

---

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

**HAVE YOU EXCHANGED ALL OF THE FRUs THAT CORRESPOND TO THE SRAs IN EACH SRN?**

---

**YES**      Contact your service support person.

**NO**      Continue on the next page.



---

## Step 7

1. Remove the last FRU you exchanged.
  2. Install the original FRU.
  3. Use the removal and replacement procedures in the section that applies to the FRU and exchange the FRU that corresponds to the next SRA in the SRN.
  4. Ask the customer to run the failing application again.
- 

### DID THE SAME FAILURE OCCUR?

- YES**     Go to "Step 6" on page 3-0080-6.
- NO**       This completes the repair.

---

## Step 8

The failure is not being detected by the diagnostic programs or the error log.  
The problem may be in the software.

---

### **DO YOU SUSPECT A SOFTWARE PROBLEM?**

**YES**     Have the customer follow the procedures for software problems.

**NO**     Continue on the next page.

---

## Step 9

The following lists devices and the most likely failing FRUs for each device:

Diskette	The adapter for the fixed-disk and diskette drives, the diskette drive, the diskette
Fixed disk	The adapter for the fixed-disk and diskette drives, the fixed-disk drive
Printer	The printer adapter, the printer, the printer cable
Plotter	The plotter adapter, the plotter, the plotter cable
Terminal	The terminal adapter, the terminal, the terminal cable
Modem	The adapter the modem is attached to, the modem, the modem cable
Coprocessor	The IBM AT Coprocessor Option, the IBM AT Math Co-processor module, the IBM AT 512KB Memory Expansion Option
Display	The display adapter, the display, the display cable
Keyboard	The keyboard, the system board
Mouse	The mouse, the system board
Tape	The tape drive adapter, the tape drive, the tape cartridge.

In addition to the above FRUs, the following common FRUs could also cause a problem:

- System board
- Processor board
- Memory expansion option
- Floating-point board
- Power supply.

---

Step 9 continues on the next page.



---

**(Step 9 continued)**

1. Find the device that best describes your failure in the lists on the previous page.
  2. Record the FRUs listed for that device and the common FRUs that are installed in your system.
  3. Replace one of the FRUs.
  4. Ask the customer to run the failing application program again.
- 

**DID THE SAME FAILURE OCCUR?**

- NO**      This completes the repair.
- YES**     Continue on the next page.

---

**Step 10**

1. Remove the last FRU you exchanged.
  2. Install the original FRU.
- 

**HAVE ALL THE FRUs YOU RECORDED BEEN EXCHANGED?**

- YES**      Contact your service support person.
- NO**        Continue on the next page.

---

## Step 11

1. Exchange the next FRU on your list.
  2. Ask the customer to run the failing application program again.
- 

### **DID THE SAME FAILURE OCCUR?**

**YES**     Go to "Step 10" on page 3-0080-11.

**NO**     This completes the repair.



---

## Intermittent Problems PIC 0090

Use this PIC for intermittent problems that do not fail while running the diagnostic routines.

### Step 1

Some problems occur every time an application program is running.

---

#### **DOES THE PROBLEM OCCUR EVERY TIME AN APPLICATION PROGRAM IS RUNNING?**

---

- YES**     Go to "Application Only Problems PIC 0080" on page 3-0080-1.
- NO**       Continue on the next page.

---

## Step 2

The AIX Operating System provides error logging.

---

### IS THE CUSTOMER USING THE "AIX OPERATING SYSTEM"?

**NO**      Go to "Step 9" on page 3-0090-9.

**YES**      Continue on the next page.

---

### Step 3

1. Ask the operator when the error last occurred.
2. Ask the operator to login on the AIX Operating System.
3. Ask the operator to print a Summary Report of all permanent errors starting about an hour before the reported error occurred. The command is (where **MMddhhmm** is month, day, hour, minute, year):

**errpt -d t04,t04 -sMMddhhmm | print**

4. Check the log for errors. If needed, see Appendix C.
- 

### **ARE ANY ERRORS RECORDED?**

---

- |            |   |
|------------|---|
| <b>NO</b>  | No trouble was found. Ask the operator to run the system with the error log turned on so that if any errors are detected they will be recorded. |
| <b>YES</b> | Continue on the next page.  |



---

#### **Step 4**

**Look at the printed Error Summary report.**

---

#### **ARE THERE ANY HARDWARE ERRORS LISTED?**

- NO**      Ask the customer to follow the procedure for resolving the types of errors listed.
- YES**      Continue on the next page.

---

## Step 5

Ask the operator to print a Detail Report of the hardware errors listed. The command is (where **MMddhhmmyy** is month, day, hour, minute, year):

**errpt -a -d t01 -d h00 -sMMddhhmmyy | print**

---

### **ARE THE HARDWARE ERRORS RELATED TO THE HARDWARE YOU SERVICE?**

---

- NO**      Ask the customer to follow the procedure for resolving the type of errors listed.
- YES**     Continue on the next page.

---

## Step 6

1. Record the SRNs for the errors that are related to the hardware you service.
  2. Look up the FRUs that correspond to the SRAs in each SRN.
  3. The FRUs are listed in the most likely to fail order.
  4. Exchange the FRUs one at a time. Check the fix by asking the customer to run the failing application program again.
- 

### **DID THE SAME FAILURE OCCUR?**

**NO**      This completes the repair.

**YES**      Continue on the next page.



---

## Step 7

One of the FRUs that correspond to the SRAs in the SRN should fix the problem.

---

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - 064

**HAVE YOU EXCHANGED ALL OF THE FRUs THAT CORRESPOND TO THE SRAs IN EACH SRN?**

---

**YES**      Contact your service support person.

**NO**        Continue on the next page.

---

## Step 8

1. Remove the last FRU you exchanged.
  2. Install the original FRU.
  3. Exchange the FRU that corresponds to the next SRA in the SRN.
  4. Ask the customer to run the failing application again.
- 

### **DID THE SAME FAILURE OCCUR?**

**YES**     Go to "Step 7" on page 3-0090-7.

**NO**     This completes the repair.

---

## Step 9

The diagnostics can be run in loop mode by selecting the Run Test Multiple Times option in the TEST METHOD SELECTION menu. Run the diagnostics in loop mode for several minutes on each device you think is failing.

---

### **DID THE DIAGNOSTICS FIND A PROBLEM?**

**YES**      Do the following steps:

1. Record the name of the FRU for each SRA in the SRN. The FRUs are listed in the most likely to fail order.
2. Exchange each FRU one at a time. Check each FRU by running the diagnostics in loop mode for several minutes.

**NO**      No trouble was found. If you still have a problem, contact your service support person.





---

## Memory Expansion Option PIC 2100

This PIC analyzes the 21x and 37x SRA numbers. The 21x SRA isolates the failure to an option. The 37x SRA isolates the failure to a single memory module. The starting addresses can be used to determine the address range where the failure occurred.

### Step 1

Look at your SRN.

---

4. Write the Service Request Number here:

13 - 37K - 21B - \_\_\_\_\_ - \_\_\_\_\_

---

**IS ANY OF THE SRAs "210"?**

**YES**      Go to "Step 6" on page 3-2100-7.

**NO**        Continue on the next page.

---

## Step 2

1. Look at the letter in the 21x (x=any letter) SRA, then find the column for that letter in the following tables.
  2. Record the switch settings shown for the letter. Go to "Step 3" on page 3-2100-4.
- 

SRA Letter	A Off On	B Off On	C Off On	D Off On	E Off On	F Off On
Switch 1	X	X	Not valid	Not valid	X	X
Switch 2	X	X	valid	valid	X	X
Switch 3	X	X	I/O	I/O	X	X
Switch 4	X	X	memory	memory	X	X
Switch 5	X	X	addresses	addresses	X	X
Switch 6	X	X			X	X
Switch 7	Either	Either			Either	Either
Switch 8	Either	Either			Either	Either
Starting Address of 256K bytes	000000	040000	080000	0C0000	100000	140000



SRA Letter	G		H		I		J		K		L	
	Off	On	Off	On	Off	On	Off	On	Off	On	Off	On
Switch 1		X		X		X		X		X		X
Switch 2		X		X		X		X		X		X
Switch 3		X		X	X		X		X		X	
Switch 4	X		X			X		X		X		X
Switch 5	X		X			X		X	X		X	
Switch 6		X	X			X	X			X	X	
Switch 7	Either		Either		Either		Either		Either		Either	
Switch 8	Either		Either		Either		Either		Either		Either	
Starting Address of 256K bytes	180000		1C0000		200000		240000		280000		2C0000	

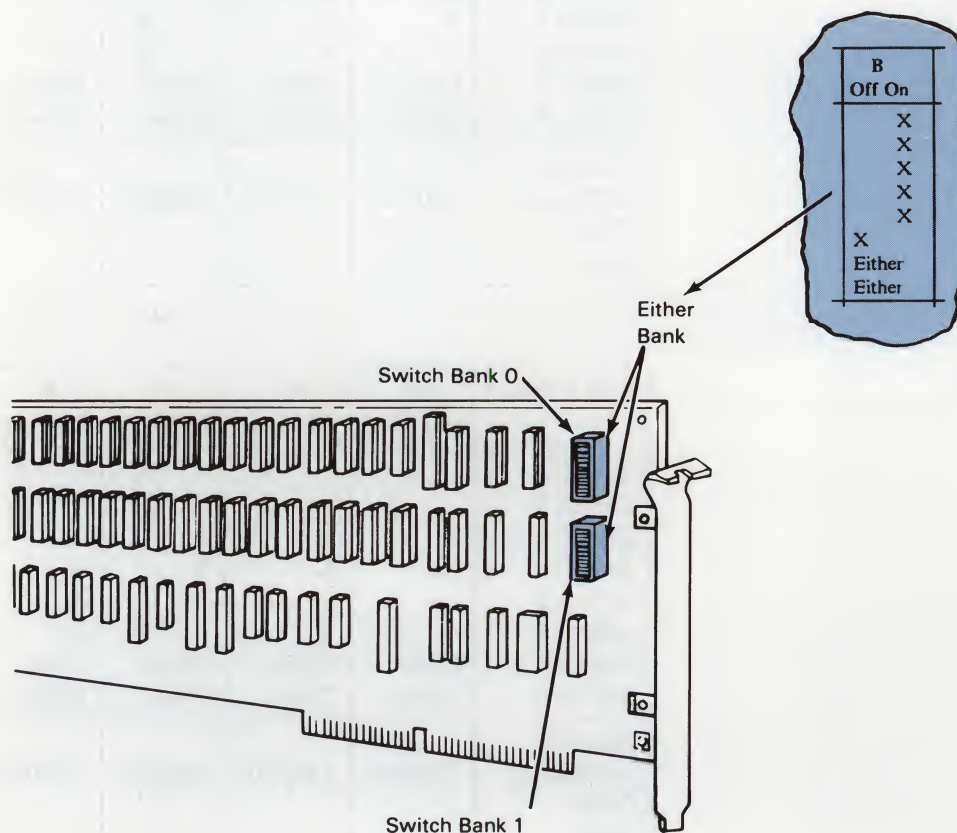
SRA Letter	M		N		O		P	
	Off	On	Off	On	Off	On	Off	On
Switch 1		X		X		X		X
Switch 2		X		X		X		X
Switch 3	X		X		X		X	
Switch 4	X		X		X		X	
Switch 5		X		X	X		X	
Switch 6		X	X			X	X	
Switch 7	Either		Either		Either		Either	
Switch 8	Either		Either		Either		Either	
Starting Address of 256K bytes	300000		340000		380000		3C0000	

---

### Step 3

Find the IBM AT 512 KB Memory Expansion Option installed in your system unit with *either* Switch Bank 0 or Switch Bank 1 set like you recorded.

---



---

Continue on the next page.

---

## Step 4

Look at your SRN.

---

4. Write the Service Request Number here:

13 - 37K - 21B - \_\_\_\_\_ - \_\_\_\_\_

### **DOES YOUR SRN HAVE A "37x" SRA?**

---

**NO**      Exchange the memory option, then go to "Step 7" on page 3-2100-8

**YES**      Continue on the next page.

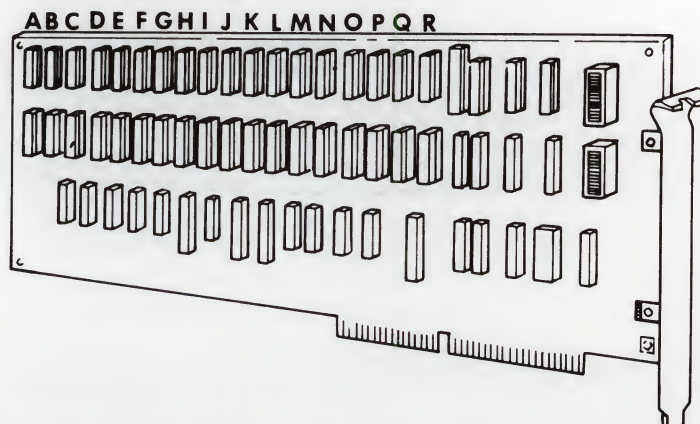


---

## Step 5

The letter of the 37x SRA identifies the failing module within a horizontal row of modules. The horizontal row is determined by the switch bank setting that corresponds to the letter in the 21x SRA.

1. Find the switch bank that corresponds to the letter in the 21x SRA.
  2. Find the module within the same horizontal row that corresponds to the letter in the 37x SRA.
  3. Exchange the module.
  4. Run xxK Bytes of IBM AT Memory Checkout. If needed see page 2-16.
- 



---

### DID A FAILURE OCCUR WITH THE SAME SRN?

- YES**      Exchange the IBM AT 512 KB Memory Expansion Option, then go to "Step 7" on page 3-2100-8.
- NO**        Go to "Step 7" on page 3-2100-8.

---

## Step 6

The diagnostic programs were unable to determine the location of the failing IBM AT 512 KB Memory Expansion Option.

1. Exchange one of the IBM AT 512 KB Memory Expansion Options.
2. Run xxK Bytes of IBM AT Memory Checkout. If needed see page 2-16.

**Note:** If the failing memory expansion option is still installed in the system unit, you will get the TEST OPTION menu. Answer the question on the menu to get an SRN.

---

<b>TEST OPTION</b>	DIAG-1
The following option was detected previously by the diagnostics, but is now undetected.	
- Option	
Has the option been removed from the system or moved to another slot?	
<u>ID</u>	<u>ITEM</u>

---

### DID YOU GET THE SAME SRN?

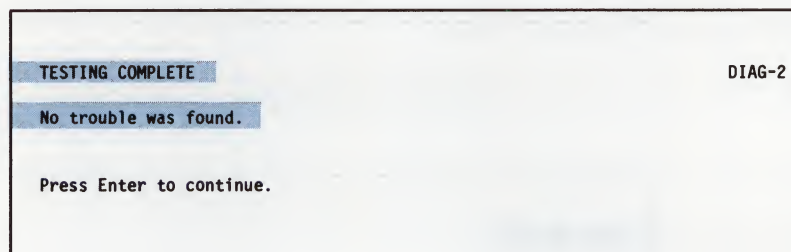
**YES** Repeat the above steps.

**NO** Continue on the next page.

---

## Step 7

1. Do the "Top Cover Replacement" on page 4-13.
  2. Run xxK Bytes of IBM AT Memory Checkout. If needed see page 2-16.
- 



---

### WERE YOU ABLE TO LOAD AND RUN THE "SYSTEM CHECKOUT" AND DID THE "NO TROUBLE WAS FOUND" MESSAGE DISPLAY?

---

- YES** This completes the repair.
- NO** If the System Checkout resulted in the same SRN that you have been analyzing, go to "Unresolved Problem PIC 0060" on page 3-0060-1 otherwise go to "Problem Determination Procedure PIC 0030" on page 3-0030-1



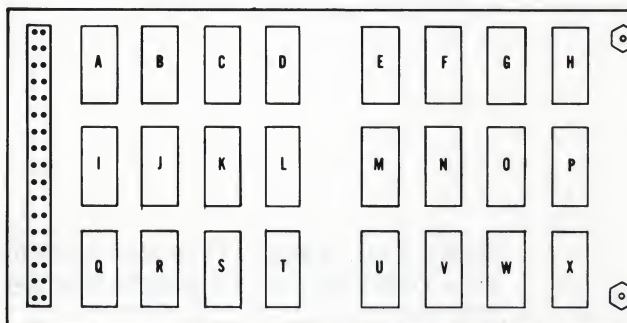
---

## IBM PC Enhanced Graphics Adapter Memory PIC 4200

This PIC analyzes the 42x and 44x SRA numbers. The letter in the 42x SRA number identifies the slot that the IBM PC Enhanced Graphics Adapter is in. The letter in the 44x SRA number identifies the failing module on the IBM PC Graphics Memory Expansion Card.

### Step 1

1. Using the drawing below, find the module that corresponds to the letter in the 44x SRA.
2. Use the "Removal and Replacement Procedures" on page 9-042-1, to exchange that module.
3. Run the Display Checkout.



---

**WERE YOU ABLE TO LOAD AND RUN THE REPAIR CHECKOUT  
AND DID THE "NO TROUBLE WAS FOUND" MESSAGE DISPLAY?**

---

**YES**      Go to "Step 4" on page 3-4200-4.

**NO**      If you were unable to select and run the Display Checkout, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1. Otherwise, continue on the next page.

---

## Step 2

1. Use the "Removal and Replacement Procedures" on page 9-042-1, to install the original module on the IBM PC Graphics Memory Expansion Card again, but do not install the card on the IBM PC Enhanced Graphics Adapter.
  2. Install the IBM PC Enhanced Graphics Adapter in the system unit without the IBM PC Graphics Memory Expansion Card.
  3. Run the Display Checkout.
- 

### **WERE YOU ABLE TO LOAD AND RUN THE REPAIR CHECKOUT AND DID THE "NO TROUBLE WAS FOUND" MESSAGE DISPLAY?**

**NO**      The IBM PC Enhanced Graphics Adapter is failing.

1. Use the "Removal and Replacement Procedures" on page 9-042-1, to exchange the IBM PC Enhanced Graphics Adapter. Be sure to install the IBM PC Graphics Memory Expansion Card on the new adapter.
2. Run the Display Checkout.

**YES**      Continue on the next page.

---

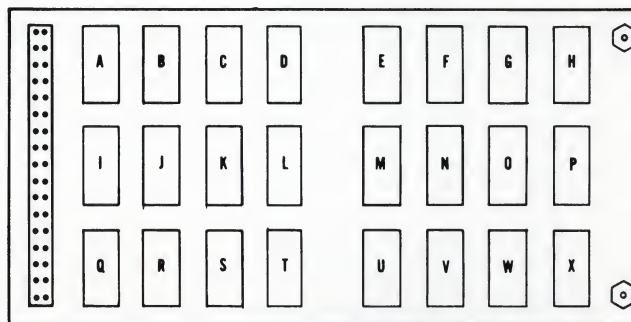
### Step 3

Exchange the following FRUs to isolate the failure. Check each FRU by running the Display Checkout. Be sure to install the original FRUs in their correct positions if they are not identified as the failing FRU.

1. Exchange the IBM PC Graphics Memory Expansion Card (install the original modules on it).
2. Exchange the modules one at a time or in groups to identify the failing module.
3. Exchange the IBM PC Enhanced Graphics Adapter.

If you still have a problem and the same SRN is displayed, go to "Unresolved Problem PIC 0060" on page 3-0060-1, otherwise go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.

---





---

#### **Step 4**

1. Install any FRUs that were removed.
  2. Run the System Checkout.
  3. If you still have a problem, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.
-

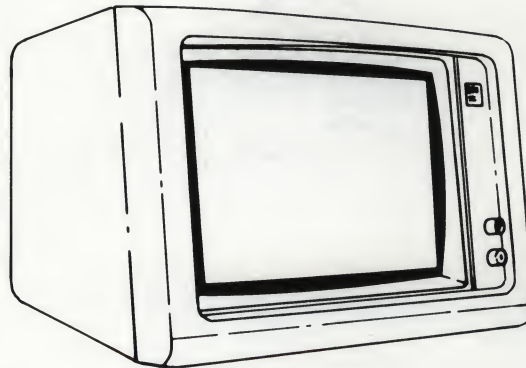
---

## IBM 5151 Personal Computer Display PIC 5400

Use this PIC to get an SRN when there is a problem that prevents you from reading the display screen easily, the two-digit display is blank, and the system unit power indicator is on.

### Step 1

1. Turn the Brightness and Contrast controls fully clockwise.
  2. Look at the display screen.
- 



---

### IS THE BACKGROUND OF THE DISPLAY LIGHTED?

---

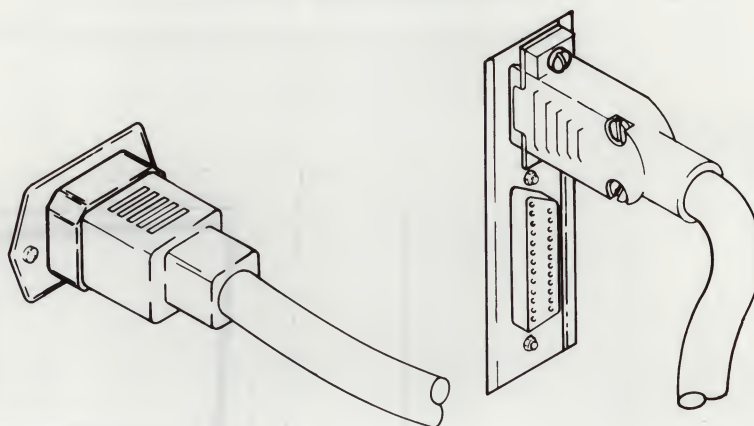
**YES**     Go to "Step 3" on page 3-5400-3.

**NO**     Continue on the next page.

## Step 2

Be sure that both the display power cable and the display signal cable are correctly connected to the system unit.

---



### **DID YOU FIND A PROBLEM?**

---

**YES** This completes the repair.

**NO** Record SRN 26-540-490, then go to "Step 5" on page 3-5400-5.

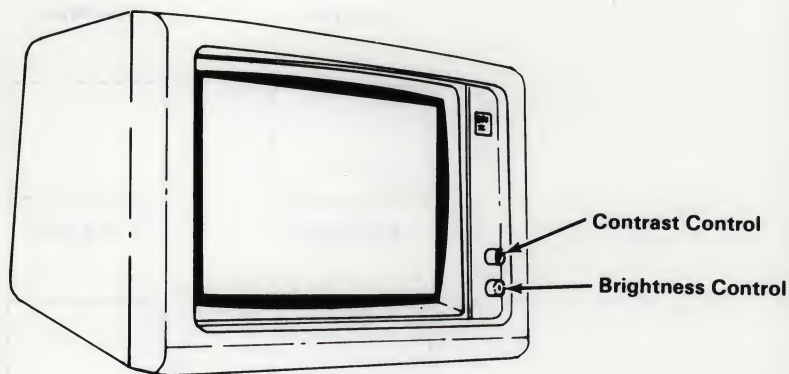


---

**Step 3**

Try to set the Brightness and Contrast controls to the desired level.

---



**WERE YOU ABLE TO SET THE DISPLAY TO THE DESIRED LEVEL?**

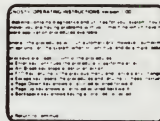
- NO**      Record SRN 26-540-490, then go to "Step 5" on page 3-5400-5.
- YES**     Continue on the next page.

## Step 4

Look at the display screen.



**Too Dim**



**Too Wide**



**Too Narrow**



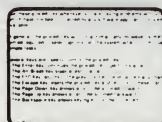
**Too Short**



**Too Small**



**Tilted**



**Changes Size When  
Brightness Control  
Turned**



**Out of Focus**



**Rolling**

**DOES YOUR DISPLAY HAVE A PROBLEM SIMILAR TO ANY OF  
THE DISPLAY SCREENS ABOVE?**

**NO** Record SRN 26-490-540, then continue on the next page.

**YES** Record SRN 26-540-490, then continue on the next page.

---

**Step 5**

Look at the display adapter your IBM 5151 is attached to. If your IBM 5151 is attached to an IBM PC Enhanced Graphics Adapter, change the 490 SRA number you recorded to 410.

---

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

**HAVE YOU ANALYZED ALL OF THE SRAs IN THE SRN USING PIC 0010?**

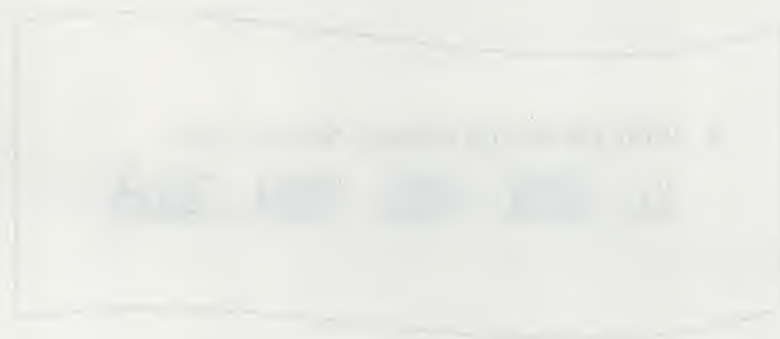
---

**YES**      Go to "Unresolved Problem PIC 0060" on page 3-0060-1.

**NO**        Go to "Step 3" on page 3-0010-4 and analyze the new SRAs.



1. Check the oil level in the engine oil pan. The oil level should be at the top of the dipstick. If the oil level is low, add oil to the top of the dipstick.



2. Check the oil level in the transmission oil pan. The oil level should be at the top of the dipstick. If the oil level is low, add oil to the top of the dipstick.

3. Check the oil level in the rear axle oil pan. The oil level should be at the top of the dipstick. If the oil level is low, add oil to the top of the dipstick.

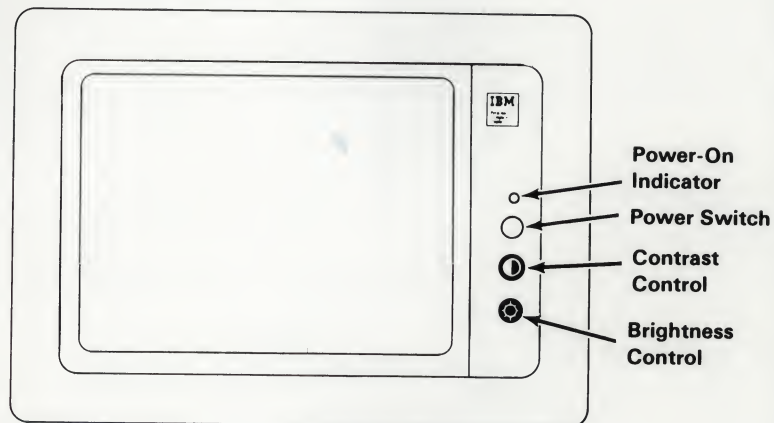
---

## IBM 5154 Enhanced Color Graphics Display PIC 5800

Use this PIC to get an SRN when there is a problem that prevents you from reading the display screen easily, the two-digit display is blank, and the power-on indicator is on.

### Step 1

1. Be sure the power switch on the display is set to On.
  2. Look at the power-on indicator on the display.
- 



---

### IS THE POWER-ON INDICATOR ON?

---

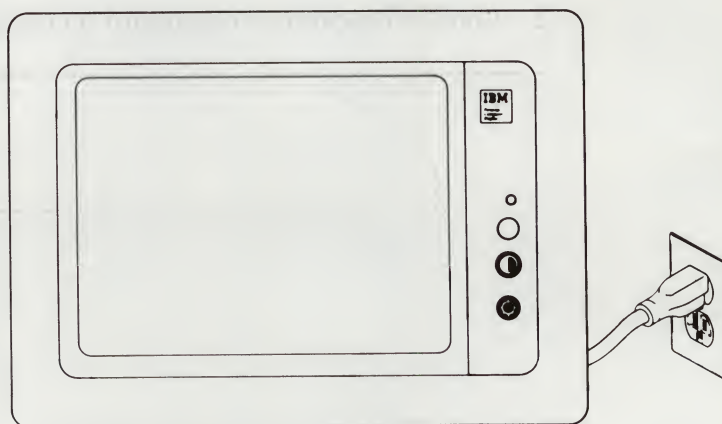
**YES** Go to "Step 3" on page 3-5800-3.

**NO** Continue on the next page.

## Step 2

Be sure the external power cable to the display is securely plugged into an outlet and the outlet has power.

---



### **DID YOU FIND A PROBLEM?**

---

**YES** This completes the repair.

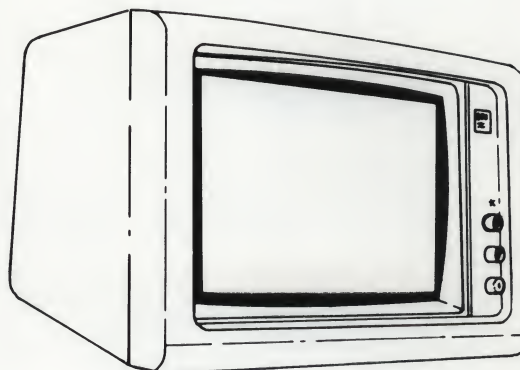
**NO** Record SRN 26-580, then go to "Step 7" on page 3-5800-7.



---

### Step 3

- | 1. Set the power switch on the system unit to Off.
  - | 2. Turn the Brightness control fully clockwise.
  - | 3. Wait 1 minute, then answer the following question.
- 



### IS THE DISPLAY SCREEN COMPLETELY LIGHTED?

---

**NO** Record SRN 26-580, then go to "Step 7" on page 3-5800-7.

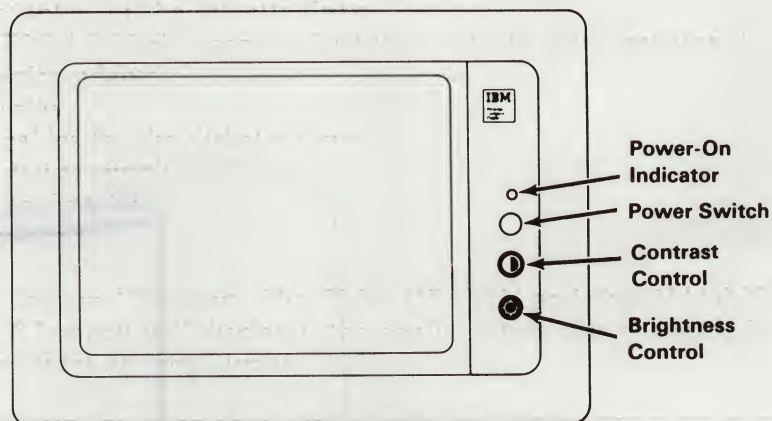
**YES** Continue on the next page.

---

## Step 4

Turn the Brightness Control fully counter-clockwise.

---



---

### IS THE SCREEN DARK?

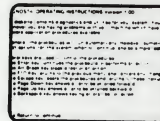
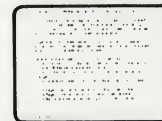
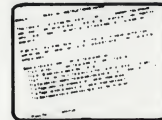
---

**NO** Record SRN 26-580, then go to "Step 7" on page 3-5800-7.

**YES** Continue on the next page.

**Step 5**

1. Set the power switch on the system unit to On.
2. Wait 4 minutes or until the OPERATING INSTRUCTIONS display.
3. Adjust the Brightness Control to the desired level.
4. Look at the display screen.

**Too Dim****Too Wide****Too Narrow****Too Short****Too Small****Tilted****Changes Size When  
Brightness Control  
Turned****Out of Focus****Rolling**

**DOES YOUR DISPLAY HAVE A PROBLEM SIMILAR TO ANY  
OF THE DISPLAY SCREENS ABOVE?**

**YES** Record SRN 26-580-410, then go to the next page.

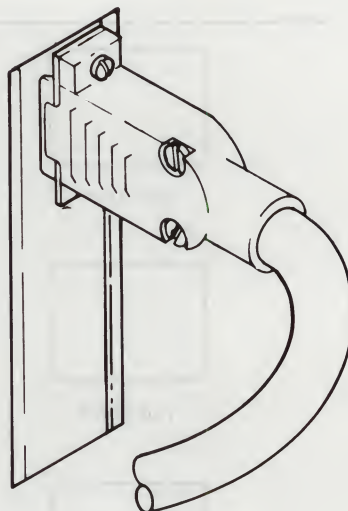
**NO** Continue on the next page.



**Step 6**

Be sure the display signal cable is securely plugged into the system unit.

---



**IS THE DISPLAY SIGNAL CABLE SECURELY PLUGGED INTO THE SYSTEM UNIT?**

---

**YES** Record SRN 16-410-580, then go to the next page.

**NO** This completes the repair.

---

**Step 7**

You may have already analyzed all the SRAs in the SRN using PIC 0010.

---

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

**HAVE YOU ANALYZED ALL OF THE SRAs IN THE SRN USING PIC 0010?**

---

**YES**      Go to "Unresolved Problem PIC 0060" on page 3-0060-1.

**NO**        Go to "Step 3" on page 3-0010-4 and analyze the new SRAs.





---

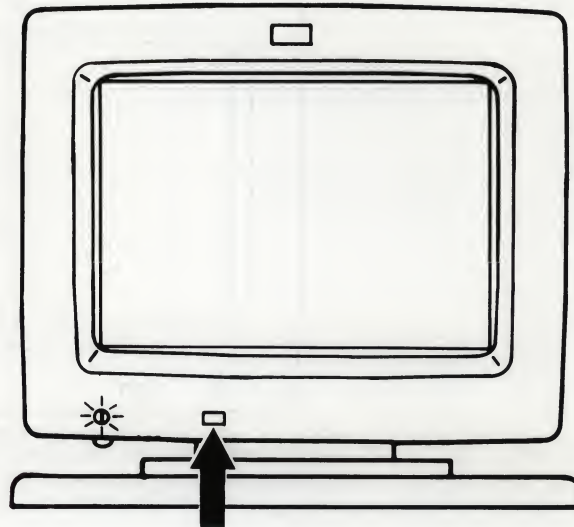
## IBM 6154 Advanced Color Display PIC 5900

Use this PIC to get an SRN when there is a problem that prevents you from reading the display screen easily, the two-digit display is blank, and the power-on indicator is on.

### Step 1

Be sure the Power On and Brightness Control is set to On.

---



---

**IS THE DISPLAY POWER-ON INDICATOR ON?**

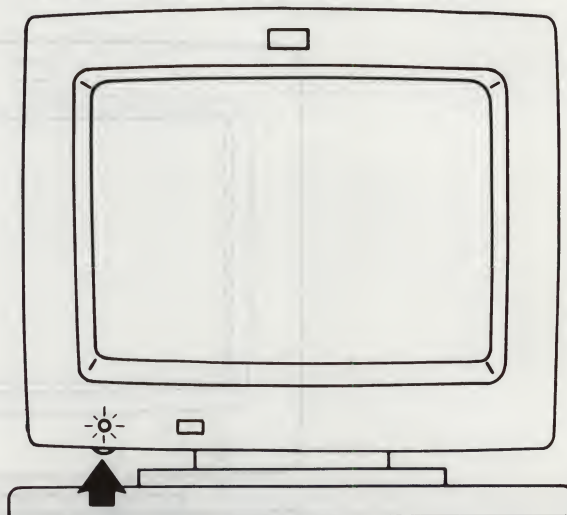
---

**NO**      Go to "Step 4" on page 3-5900-4.

**YES**      Continue on the next page.

## Step 2

1. Set the power switch on the system unit to Off.
  2. Turn the Power On and Brightness Control fully clockwise.
  3. Wait about 1 minute.
- 



**IS THE SCREEN COMPLETELY LIGHTED EXCEPT FOR THE BORDER?**

---

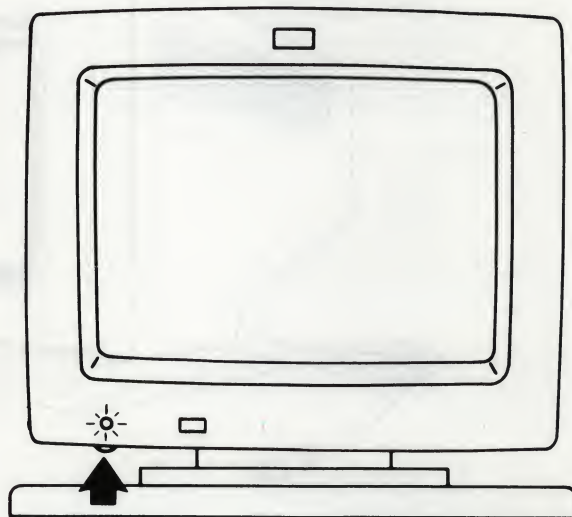
**NO** Record SRN 26-590, then go to "Step 7" on page 3-5900-7.

**YES** Continue on the next page.

---

**Step 3**

1. Set the power switch on the system unit to On.
  2. Wait about 4 minutes.
  3. Try to set the Power On and Brightness Control to the desired level, then answer the following question.
- 



---

**WERE YOU ABLE TO ADJUST THE DISPLAY TO THE DESIRED LEVEL?**

---

**YES**      Go to "Step 5" on page 3-5900-5.

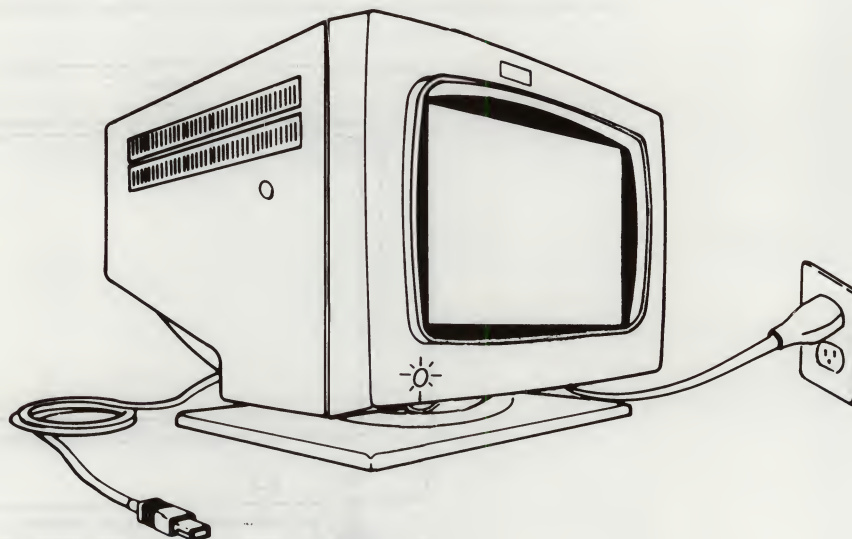
**NO**        Record SRN 26-590-450, then go to "Step 7" on page 3-5900-7.



#### Step 4

Be sure that the display power cable is correctly connected to an outlet and that the outlet has power.

---



#### DID YOU FIND A PROBLEM?

---

**YES**      This completes the repair.

**NO**      Record SRN 26-590, then go to “Step 7” on page 3-5900-7.

## Step 5

Look at the display screen.



Too Dim



Too Wide



Too Narrow



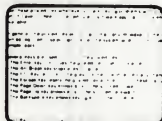
Too Short



Too Small



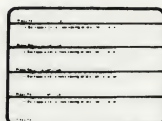
Tilted



Changes Size When  
Brightness Control  
Turned



Out of Focus



Rolling

**DOES YOUR DISPLAY HAVE A PROBLEM SIMILAR TO ANY OF  
THE DISPLAY SCREENS ABOVE?**

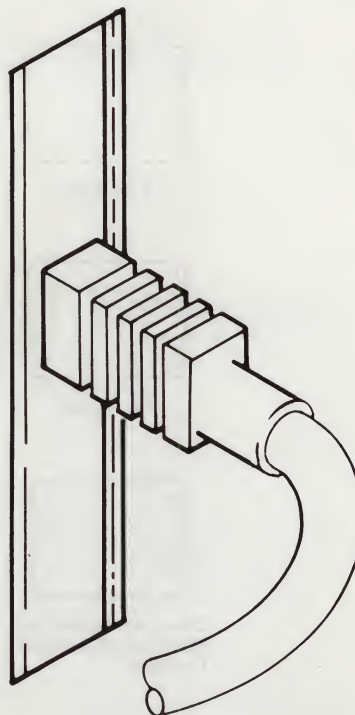
**YES** Record SRN 26-590-450, then go to "Step 7" on page 3-5900-7.

**NO** Continue on the next page.

## Step 6

Be sure the display signal cable is securely plugged into the system unit.

---



**IS THE DISPLAY SIGNAL CABLE SECURELY PLUGGED INTO THE SYSTEM UNIT?**

---

**YES** Record SRN 16-450-590, then go to the next page.

**NO** This completes the repair.



---

## Step 7

You may have already analyzed all the SRAs in the SRN using PIC 0010.

---

4. Write the Service Request Number here:

13 - 234 - 1DD - B34 - D64

**HAVE YOU ANALYZED ALL OF THE SRAs IN THE SRN USING PIC 0010?**

---

**YES**      Go to "Unresolved Problem PIC 0060" on page 3-0060-1.

**NO**        Go to "Step 3" on page 3-0010-4 and analyze the new SRAs.



---

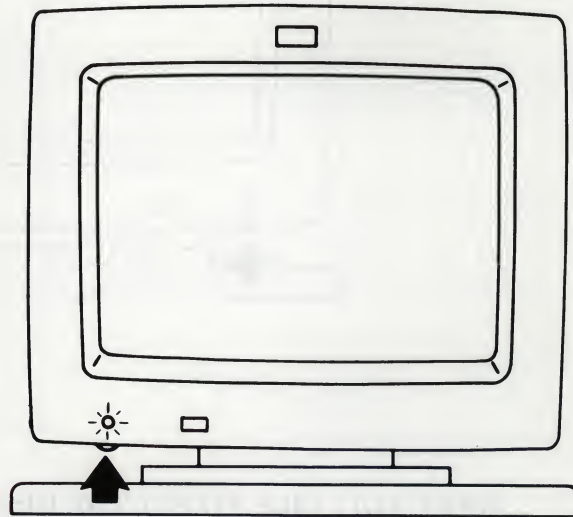
## IBM 6153 Advanced Monochrome Graphics Display PIC 6000

Use this PIC to get an SRN when there is a problem that prevents you from reading the display screen easily, the two-digit display is blank, and the power-on indicator is on.

### Step 1

Turn the Brightness and Raster Test control fully clockwise until it clicks into the *raster test* position.

---



---

**IS THE DISPLAY SCREEN COMPLETELY LIGHTED?**

---

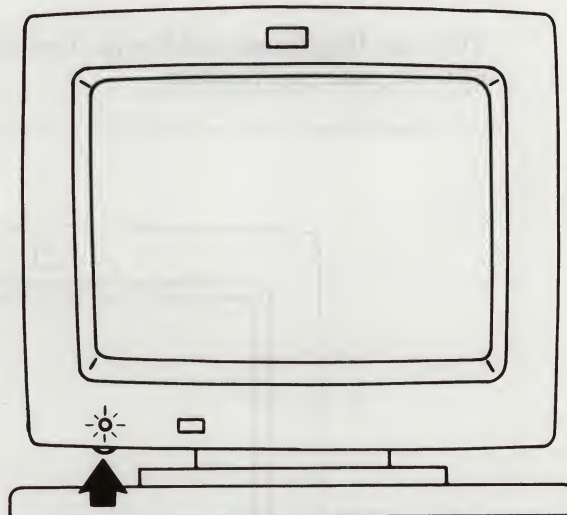
**NO**      Go to "Step 3" on page 3-6000-3.

**YES**      Continue on the next page.



## Step 2

Try to set the Brightness and Raster Test control to the desired level.



### WERE YOU ABLE TO SET THE DISPLAY TO THE DESIRED LEVEL?

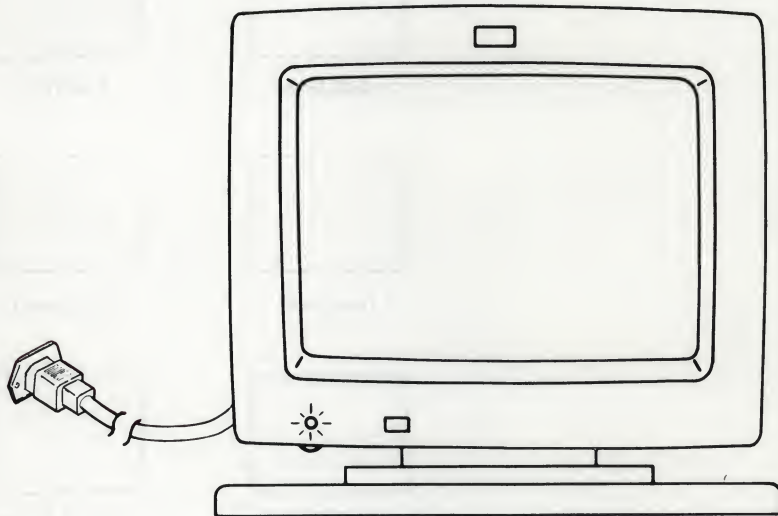
- NO** Record SRN 26-600-430, then go to "Step 6" on page 3-6000-6.
- YES** Go to "Step 4" on page 3-6000-4.

---

### Step 3

Be sure that the display power cable is correctly connected to the system unit.

---



---

#### **DID YOU FIND A PROBLEM?**

**YES** This completes the repair.

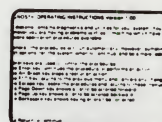
**NO** Record SRN 26-600, then go to "Step 6" on page 3-6000-6.

## Step 4

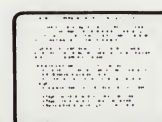
Look at the display screen.



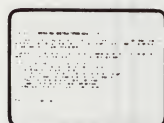
Too Dim



Too Wide



Too Narrow



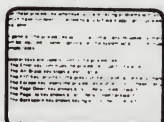
Too Short



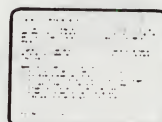
Too Small



Tilted



Changes Size When  
Brightness Control  
Turned



Out of Focus



Rolling

**DOES YOUR DISPLAY HAVE A PROBLEM SIMILAR TO ANY OF THE DISPLAY SCREENS ABOVE?**

**YES** Record SRN 26-600-430, then go to "Step 6" on page 3-6000-6.

**NO** Continue on the next page.

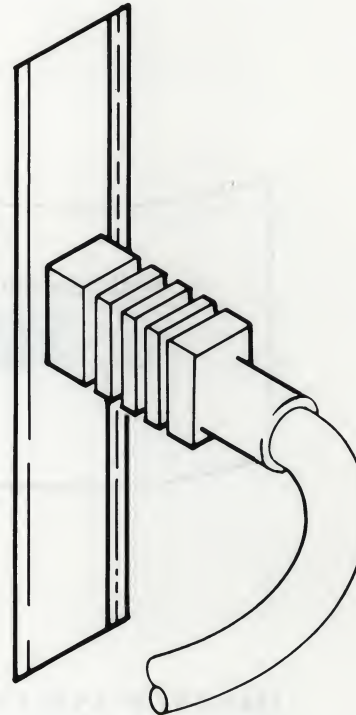


---

**Step 5**

Be sure the display signal cable is securely plugged into the system unit.

---



**IS THE DISPLAY SIGNAL CABLE SECURELY PLUGGED INTO THE SYSTEM UNIT?**

---

- YES**      Record SRN 16-430-600, then go to "Step 6" on page 3-6000-6.
- NO**        This completes the repair.

## Step 6

You may have already analyzed all the SRAs in the SRN using PIC 0010.

---

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

**HAVE YOU ANALYZED ALL OF THE SRAs IN THE SRN USING PIC 0010?**

---

**YES**      Go to "Unresolved Problem PIC 0060" on page 3-0060-1.

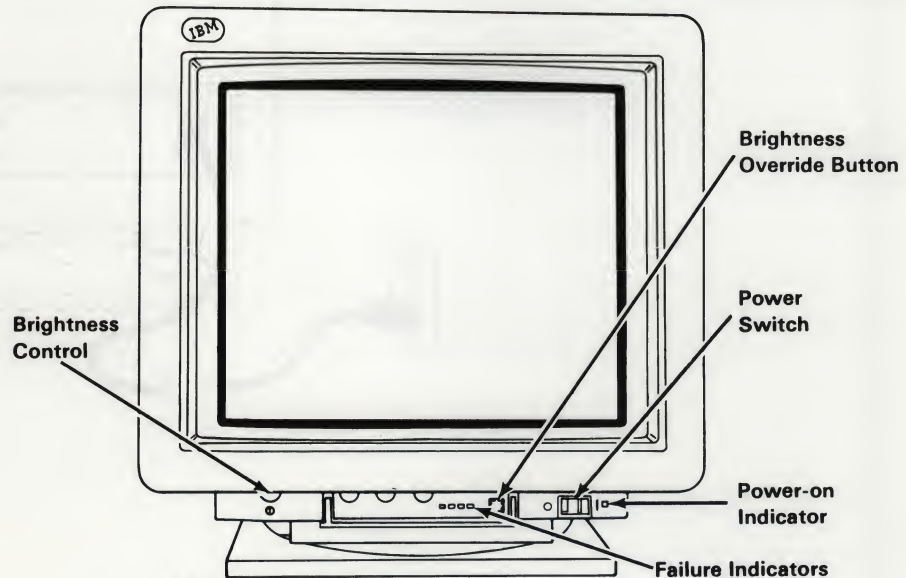
**NO**        Go to "Step 3" on page 3-0010-4 and analyze the new SRAs.

## IBM 5081 Display PIC 6100

Use this PIC to get an SRN when there is a problem that prevents you from reading the display screen easily, the two-digit display is blank, and the power-on indicator is on.

### Step 1

1. Be sure the power switch on the IBM 5081 is set to On.
2. Look at the power-on indicator on the IBM 5081.



### IS THE DISPLAY POWER-ON INDICATOR ON?

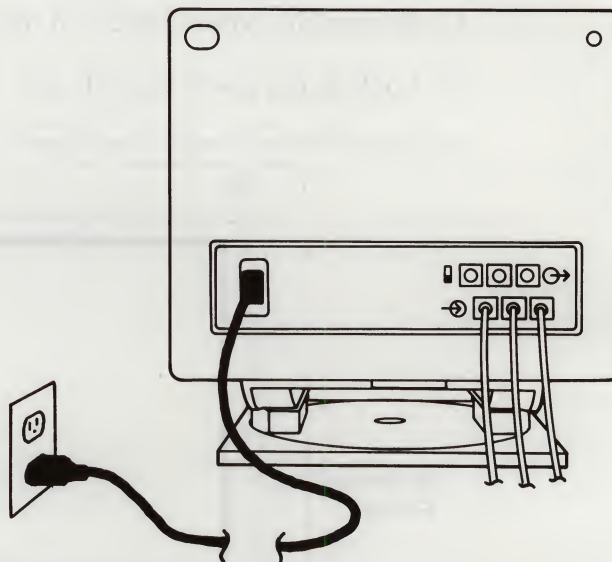
- YES**    Go to "Step 3" on page 3-6100-3.
- NO**     Continue on the next page.



## | Step 2

| Be sure the display power cable is connected to the IBM 5081 and to an  
| outlet. Be sure that the outlet has power.  
|

---



### | **DID YOU FIND A PROBLEM?**

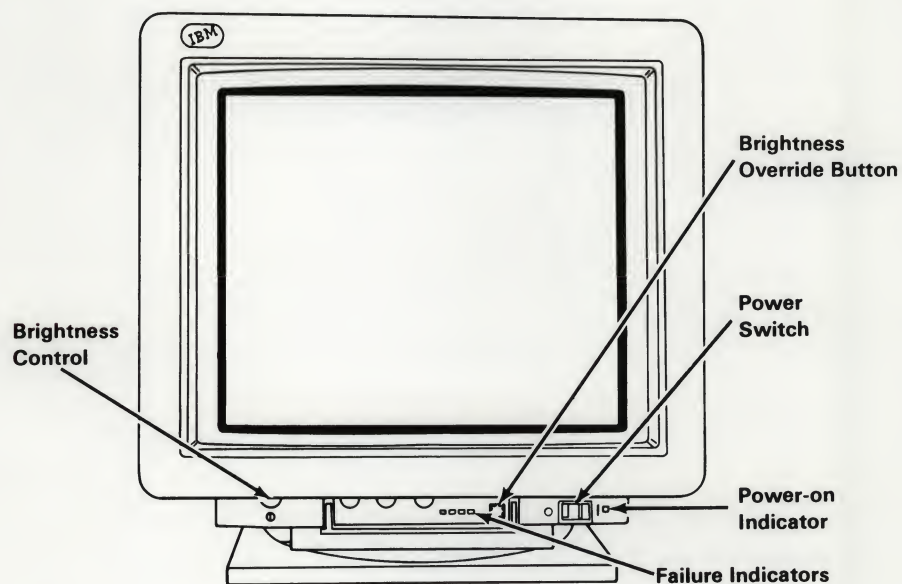
---

| **YES** This completes the repair.

| **NO** Record SRN 26-610, then go to "Step 8" on page 3-6100-8.

**Step 3**

Look at the four red display-failure indicators.



**ARE ANY OF THE FOUR RED DISPLAY FAILURE INDICATORS ON?**

**YES** Record SRN 26-610, then go to "Step 8" on page 3-6100-8.

**NO** Continue on the next page.

**| Step 4**

| Be sure the display signal cable is securely plugged into the system unit.  
|

---

| **IS THE DISPLAY SIGNAL CABLE SECURELY PLUGGED INTO**  
| **THE SYSTEM UNIT?**

---

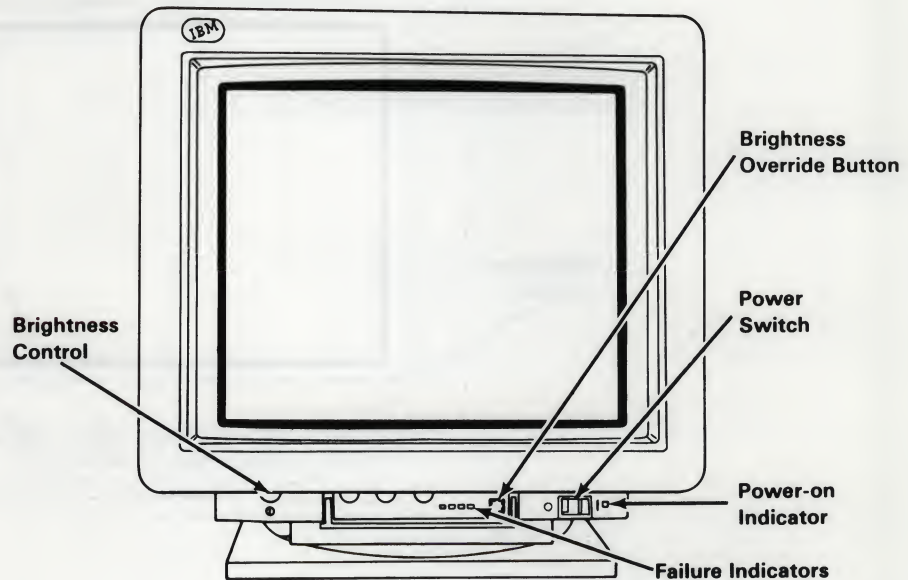
| **NO** This completes the repair.

| **YES** Continue on the next page.



## Step 5

1. Set the power switch on the system unit to Off.
2. Open the customer access door on the front of the IBM 5081.
3. Press and hold the Brightness Override Button while answering the following question.

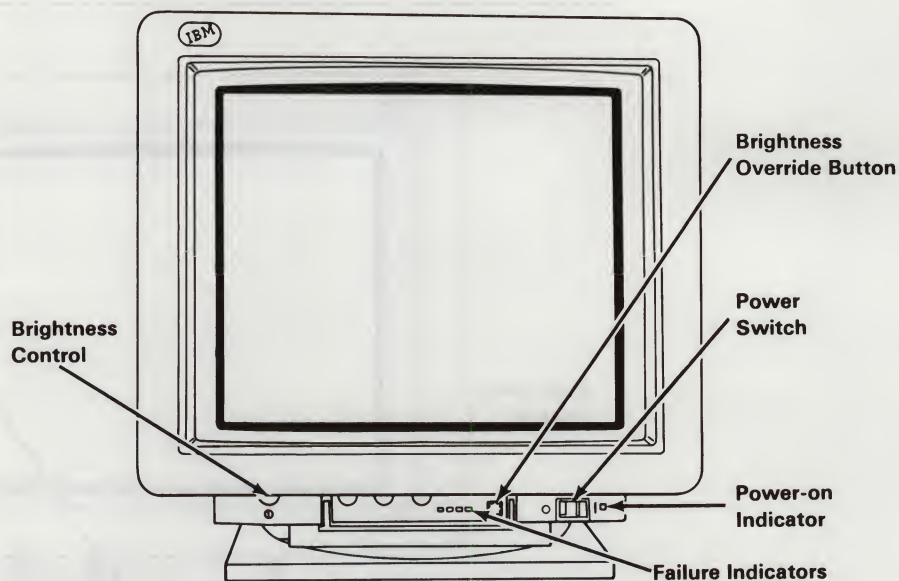


### IS THE DISPLAY SCREEN LIGHTED?

- NO** Record SRN 26-610, then go to "Step 8" on page 3-6100-8.
- YES** Continue on the next page.

## Step 6

1. Set the power switch on the system unit to On.
2. Wait about 4 minutes, then try to set the Brightness Control to the desired level before answering the following question.



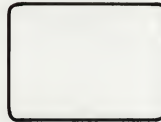
**WERE YOU ABLE TO SET THE BRIGHTNESS TO THE DESIRED LEVEL?**

**NO** Record SRN 26-610, then go to "Step 8" on page 3-6100-8.

**YES** Continue on the next page.

**Step 7**

Look at the display to answer the following question.



**Too Dim**



**Too Wide**



**Too Narrow**



**Blank**



**Too Short**



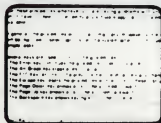
**Too Small**



**Tilted**



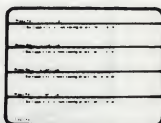
**Split Screen**



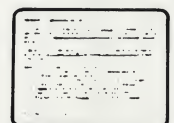
**Changes Size When  
Brightness Control  
Turned**



**Out of Focus**



**Rolling**



**Text  
Smeared**

**DOES YOUR DISPLAY HAVE A PROBLEM SIMILAR TO ANY OF THE DISPLAY SCREENS ABOVE OR HAS IT LOST A PRIMARY COLOR?**

**YES** Record SRN 26-610-4B0, then go to the next page.

**NO** Record SRN 26-4A0-4B0-610, then go to the next page.



**Step 8**

You may have already analyzed all the SRAs in the SRN using PIC 0010.

---

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

**HAVE YOU ANALYZED ALL OF THE SRAs IN THE SRN USING PIC 0010?**

---

**YES** Go to “Unresolved Problem PIC 0060” on page 3-0060-1.

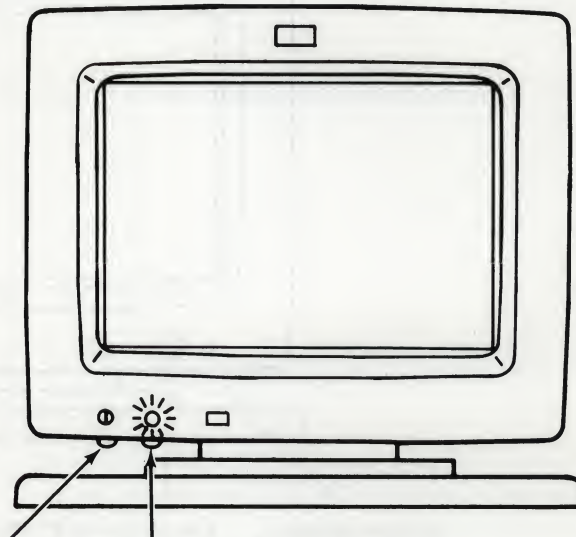
**NO** Go to “Step 3” on page 3-0010-4 and analyze the new SRAs.

## IBM 6155 Extended Monochrome Graphics Display PIC 6200

Use this PIC to get an SRN when there is a problem that prevents you from reading the display screen easily, the two-digit display is blank, and the power-on indicator is on.

### Step 1

Be sure the Power On and Brightness Control is set to On.



Contrast Control

Power On and Brightness Control

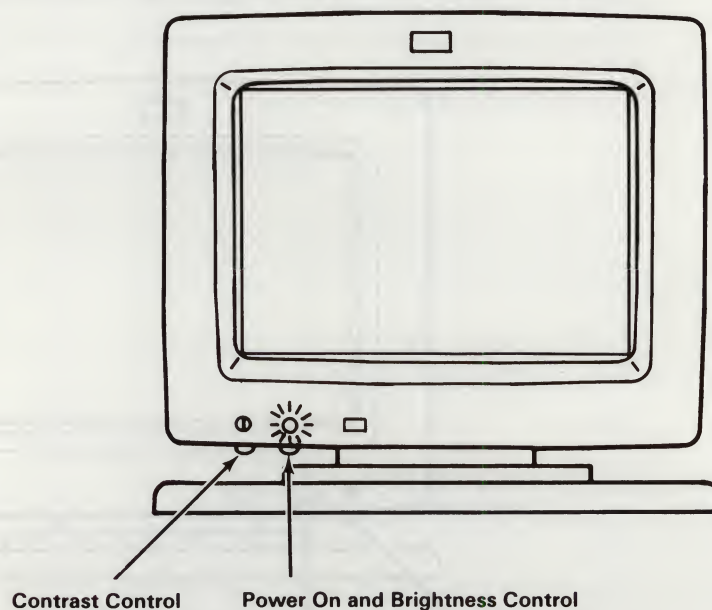
### IS THE DISPLAY POWER-ON INDICATOR ON?

**NO** Go to "Step 4" on page 3-6200-4.

**YES** Continue on the next page.

## Step 2

1. Set the power switch on the system unit to Off.
  2. Turn the Power On and Brightness Control fully clockwise.
  3. Wait about 1 minute.
- 



**IS THE SCREEN COMPLETELY LIGHTED EXCEPT FOR THE BORDER?**

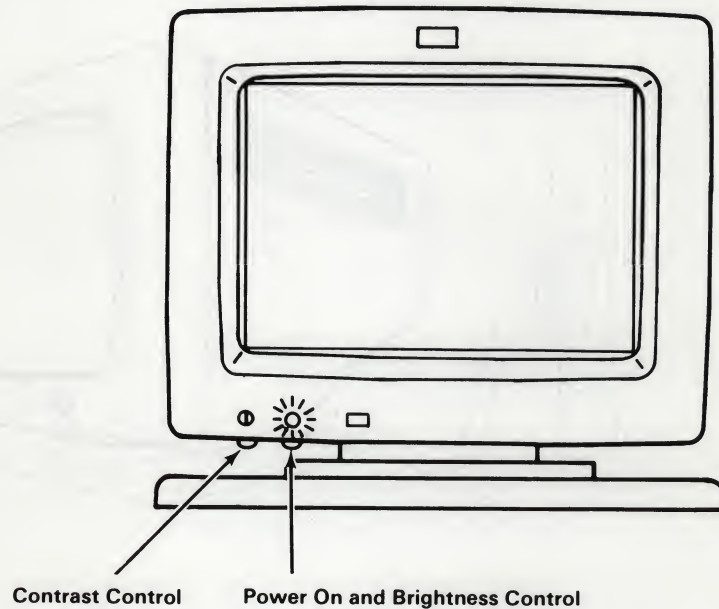
---

- NO**      Record SRN 26-620, then go to "Step 7" on page 3-6200-7.
- YES**     Continue on the next page.



### Step 3

1. Set the power switch on the system unit to On.
2. Wait about 4 minutes.
3. Try to set the Power On and Brightness Control to the desired level, then answer the following question.



**WERE YOU ABLE TO ADJUST THE DISPLAY TO THE DESIRED LEVEL?**

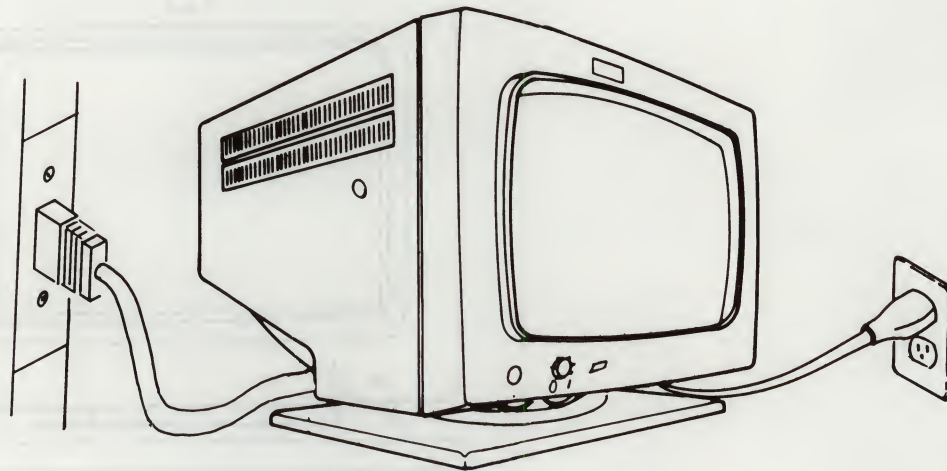
**YES** Go to "Step 5" on page 3-6200-5.

**NO** Record SRN 26-620-470, then go to "Step 7" on page 3-6200-7.

#### Step 4

Be sure the display power cable is connected to an outlet and that the outlet has power.

---



#### **DID YOU FIND A PROBLEM?**

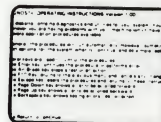
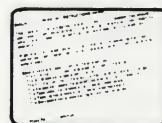
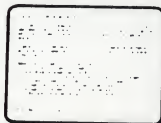
---

**YES**      This completes the repair.

**NO**      Record SRN 26-620-470, then go to "Step 7" on page 3-6200-7.

**Step 5**

Look at the display screen.

**Too Dim****Too Wide****Too Narrow****Too Short****Too Small****Tilted****Changes Size When  
Brightness Control  
Turned****Out of Focus****Rolling**

**DOES YOUR DISPLAY HAVE A PROBLEM SIMILAR TO ANY OF  
THE DISPLAY SCREENS ABOVE?**

**YES** Record SRN 26-620-470, then go to "Step 7" on page 3-6200-7.

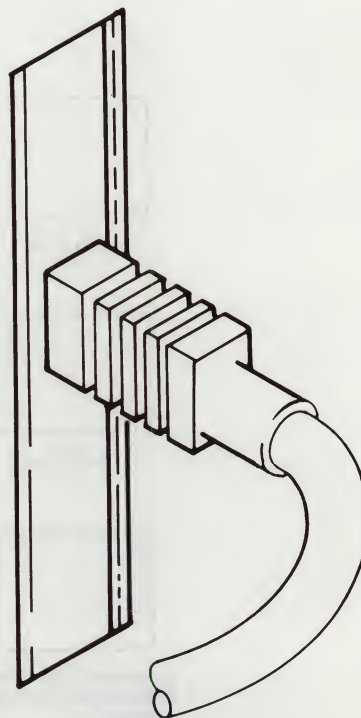
**NO** Continue on the next page.



## Step 6

Be sure the display signal cable is securely plugged into the system unit.

---



**IS THE DISPLAY SIGNAL CABLE SECURELY PLUGGED INTO THE SYSTEM UNIT?**

---

**YES** Record SRN 16-470-620, then go to the next page.

**NO** This completes the repair.

---

**Step 7**

You may have already analyzed all the SRAs in the SRN using PIC 0010.

---

4. Write the Service Request Number here:

13 - 234 - 100 - B34 - D64

**HAVE YOU ANALYZED ALL OF THE SRAs IN THE SRN USING PIC 0010?**

---

**YES**      Go to "Unresolved Problem PIC 0060" on page 3-0060-1.

**NO**        Go to "Step 3" on page 3-0010-4 and analyze the new SRAs.





---

## Power Supply PIC 8800

Use this PIC to analyze the 880 SRA number.

### Notes:

1. Some system unit components do not cool correctly when the top cover is off. For this reason do not power the system unit on longer than 10 minutes with the top cover off.
2. When you set the power switch on the system unit to Off, wait 30 seconds before setting the power switch to On.

### Step 1

Be sure that the system unit external power cable is plugged into both the system unit and the outlet and that the outlet has the correct voltage. If needed, see Section 5.

---

---

### DID YOU FIND A PROBLEM?

**YES**     Go to "Step 14" on page 3-8800-14.

**NO**     Continue on the next page.

---

## Step 2

1. Set the power switch on the system unit to Off.
  2. Do the "Top Cover Removal" on page 4-12.
  3. Unplug the external power cable to the system unit.
  4. Disconnect the large power connector from the system board, the power connector from the fixed-disk drive, and the power connector from the diskette drive.
  5. Plug in the external power cable to the system unit.
  6. Set the power switch on the system unit to On.
  7. Wait 15 seconds, then answer the following question.
- 

### **IS THE POWER-ON INDICATOR ON?**

---

**NO**      Go to "Step 6" on page 3-8800-6.

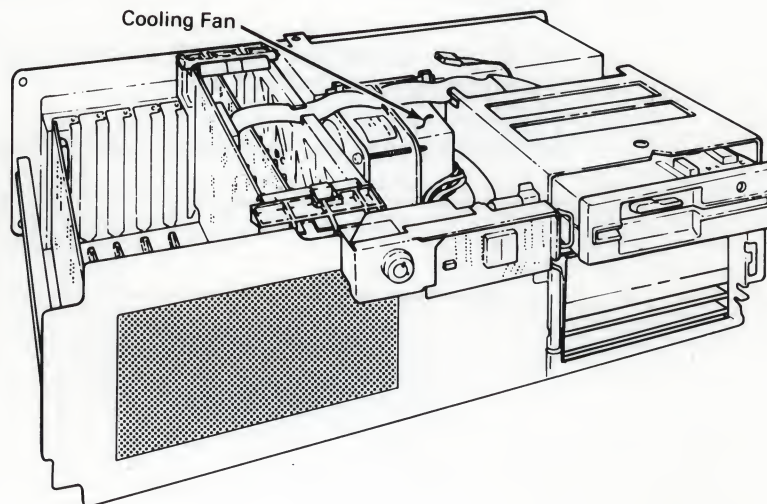
**YES**      Continue on the next page.

---

### Step 3

Listen to the system unit or hold a piece of paper near the air outlet.

---



#### **IS THE COOLING FAN OPERATING?**

---

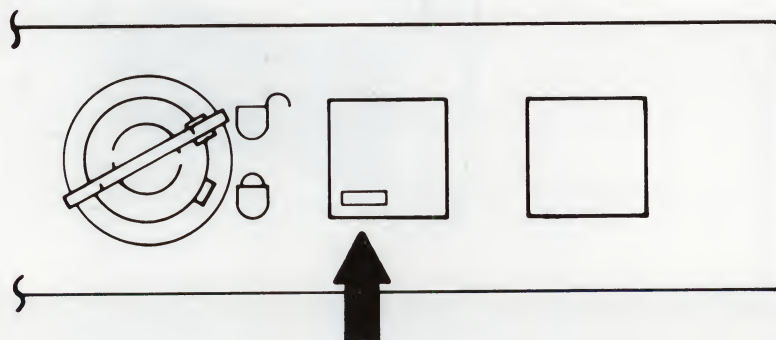
- NO**      Exchange the cooling fan assembly, then go to "Step 14" on page 3-8800-14.
- YES**     Continue on the next page.



---

## Step 4

1. Set the power switch on the system unit to Off.
  2. Unplug the external power cable to the system unit.
  3. Connect the large power connector to the system board.
  4. Plug in the external power cable to the system unit.
  5. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  6. Wait 15 seconds, then answer the following question.
- 



---

### IS THE POWER-ON INDICATOR ON?

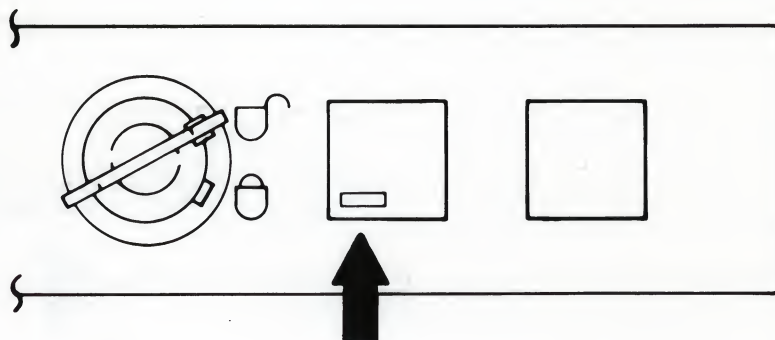
---

- NO**      Go to "Step 9" on page 3-8800-9.
- YES**      Continue on the next page.

---

## Step 5

1. Set the system unit power switch to Off.
  2. Connect the power connector to the diskette drive.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Wait 15 seconds, then answer the following question.
- 



---

### IS THE POWER-ON INDICATOR ON?

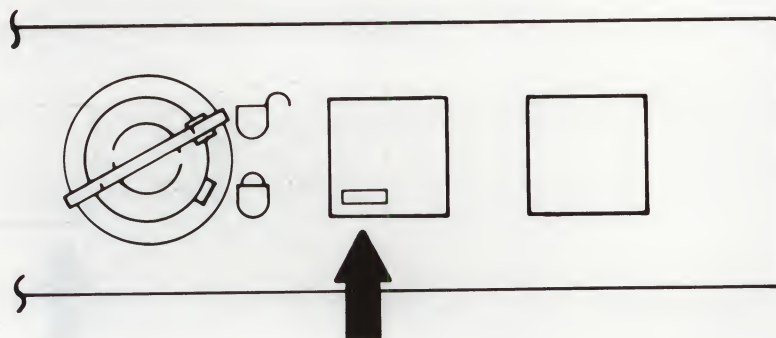
---

- NO** Exchange the diskette drive, then go to "Step 14" on page 3-8800-14.
- YES** Exchange the fixed-disk drive, then go to "Step 14" on page 3-8800-14.

---

## Step 6

1. Set the power switch on the system unit to Off.
  2. Disconnect the power connector at the cooling fan.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Wait 15 seconds, then answer the following question.
- 



---

### IS THE POWER-ON INDICATOR ON?

---

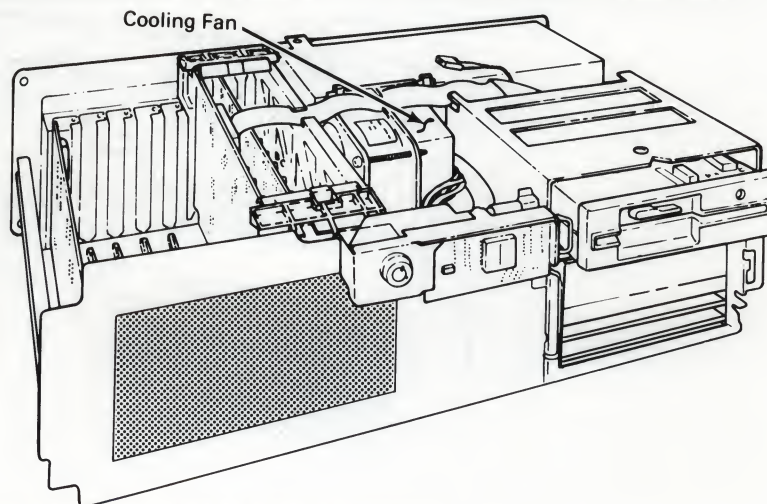
- YES**     Exchange the cooling fan assembly, then connect any connectors that are disconnected. Go to "Step 14" on page 3-8800-14.
- NO**      Continue on the next page.



---

## Step 7

1. Set the power switch on the system unit to Off.
2. Connect the power connector to the cooling fan.
3. Disconnect the smaller power cable connector from the system board.
4. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
5. Wait 15 seconds, then answer the following question.



---

### IS THE COOLING FAN OPERATING?

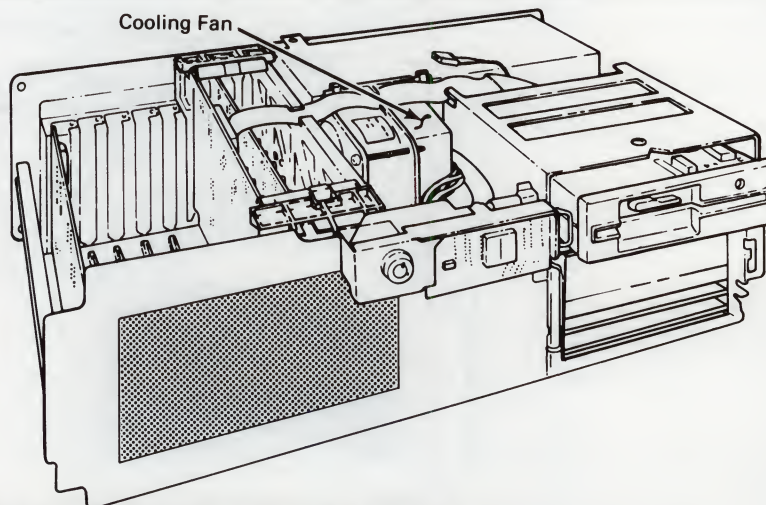
---

- NO** Check the external power cable for damage, if none, exchange the power supply. Go to "Step 14" on page 3-8800-14.
- YES** Continue on the next page.

---

## Step 8

1. Set the system unit power switch to Off.
2. Connect the smaller power cable connector to the system board.
3. Disconnect the operator panel cable from the system board.
4. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
5. Wait 15 seconds, then answer the following question.



### **IS THE COOLING FAN OPERATING?**

---

**NO**      Exchange the system board, then go to "Step 14" on page 3-8800-14.

**YES**      Exchange the operator panel, then go to "Step 14" on page 3-8800-14.

---

## Step 9

1. Set the system unit power switch to Off.
  2. Disconnect the keyboard and mouse cables.
  3. Disconnect all of the external device cables.
  4. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  5. Wait 15 seconds, then answer the following question.
- 

### **IS THE POWER-ON INDICATOR ON?**

---

**YES**      One of the external devices is defective. Do the following:

1. Set the power switch on the system unit to Off.
2. Connect the cable to an external device.
3. Set the power switch on the system unit to On.
4. If the Power-On indicator is on, repeat these Steps. If the Power-On indicator is off, exchange or repair the last device connected. Go to "Step 14" on page 3-8800-14.

**NO**      Continue on the next page.



---

## Step 10

1. Set the system unit power switch to Off.
  2. Disconnect all of the internal cables to the adapters.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Wait 15 seconds, then answer the following question.
- 

### **IS THE POWER-ON INDICATOR ON?**

---

- YES**     One of the internal devices or cables is defective. Do the following:
1. Set the power switch on the system unit to Off.
  2. Connect one of the internal cables.
  3. Set the power switch on the system unit to On.
  4. If the Power-On indicator is on, repeat these Steps. If the Power-On indicator is off, exchange the last device or cable connected. Go to "Step 14" on page 3-8800-14.
- NO**     Continue on the next page.

---

## Step 11

1. Set the power switch on the system unit to Off.
  2. Remove one of the adapters or boards from the system board.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Wait 15 seconds.
  5. If the Power-On indicator is off, repeat the steps until the Power-On indicator is on, then answer the question below.
- 

### **DID YOU FIND A FAILING ADAPTER OR BOARD?**

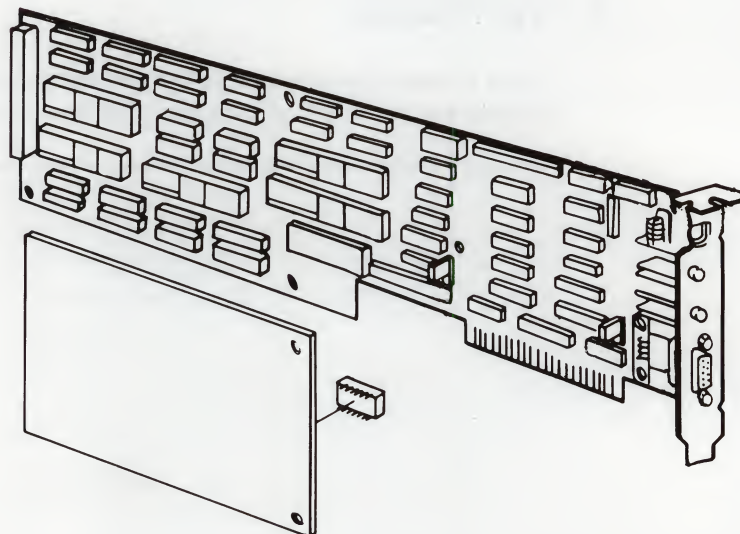
- NO**      Exchange the system board, then install all units removed and connect any cables that are disconnected. Go to "Step 14" on page 3-8800-14.
- YES**      Continue on the next page.

---

## Step 12

Some options and adapters contain more than one FRU.

---



---

### DOES THE FAILING ADAPTER HAVE ADDITIONAL FRUs?

---

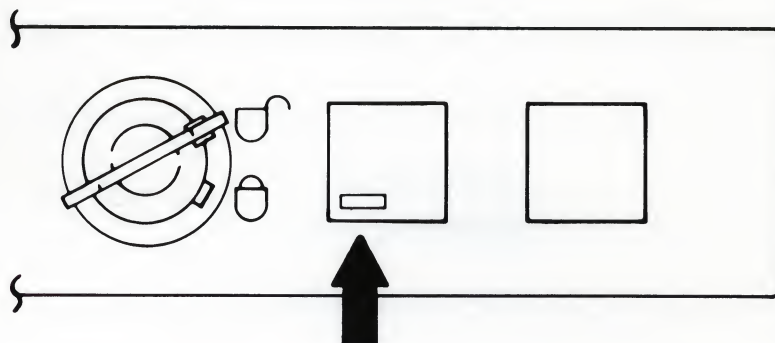
- NO**      Exchange the failing adapter or board, then go to “Step 14” on page 3-8800-14.
- YES**      Continue on the next page.



---

### Step 13

1. Set the power switch on the system unit to Off.
  2. Remove the failing option or adapter from the system unit.
  3. Remove the additional FRUs.
  4. Install the failing option or adapter back in the system unit.
  5. Set the power switch on the system unit to On, then wait 15 seconds before answering the following question.
- 



---

#### IS THE POWER-ON INDICATOR ON?

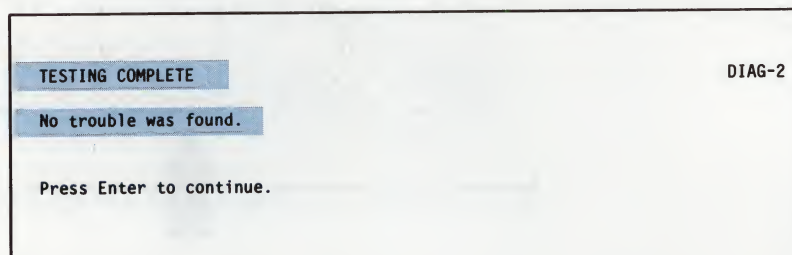
---

- NO** Exchange the failing option or adapter, then continue on the next page.
- YES** One of the additional FRUs you removed is failing. If only one FRU was removed, exchange it. Otherwise, install the FRUs one at a time until you identify the failing FRU, then exchange it and continue on the next page.

---

## Step 14

1. Set the power switch on the system unit to Off.
  2. If any, look at the type and slot positions you recorded, then install the boards and adapters you removed
  3. Connect any connectors that are disconnected.
  4. If removed, do the "Top Cover Replacement" on page 4-13.
  5. Set the power switch on the system unit to On.
  6. Run the System Checkout. If needed, see page 2-16.
- 



### **WERE YOU ABLE TO LOAD AND RUN THE "SYSTEM CHECKOUT" AND DID THE "NO TROUBLE WAS FOUND" MESSAGE DISPLAY?**

- NO**      Go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.
- YES**      This completes the repair.

---

## **POST Errors 03 or 05 PIC 9810**

Use this PIC to analyze the 981 SRA number.

### **Step 1**

1. Do the "Top Cover Removal" on page 4-12.
  2. Plug the external power cable into the outlet.
  3. Remove the fixed-disk and diskette drive adapter from slot 6.
- 

### **IS THERE A BOARD IN SLOT B OR D?**

**NO**      Go to "Step 5" on page 3-9810-5.

**YES**      Continue on the next page.



---

## Step 4

1. Set the power switch on the system unit to Off.
  2. Remove the memory board in slot C and record the type.
  3. Install the memory board you removed from slot D in slot C.
  4. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  5. Wait 2 minutes, then answer the following question.
- 

### **IS "23" DISPLAYED IN THE TWO-DIGIT DISPLAY?**

**YES**      Set the power switch on the system unit to Off.

1. Move the memory board now in slot C to slot D.
2. Exchange the memory board that was in slot C.
3. Go to "Step 8" on page 3-9810-8.

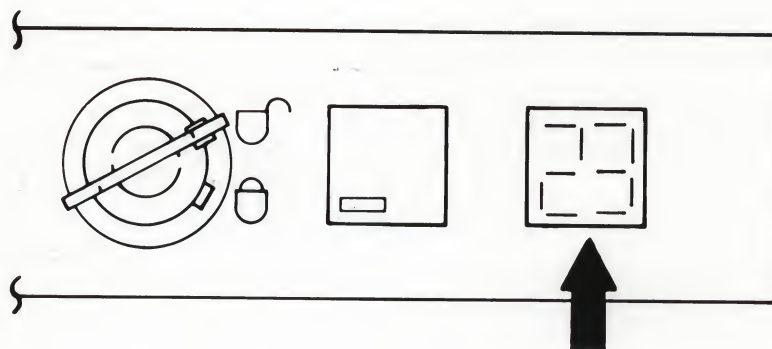
**NO**      Set the power switch on the system unit to Off.

1. Remove the memory board from slot C.
2. Look at the memory board type you recorded, then install the original memory board in slot C.
3. Go to "Step 6" on page 3-9810-6.

---

## Step 5

1. Exchange the memory board in slot C.
  2. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  3. Wait 2 minutes, then answer the following question.
- 



---

### IS "23" DISPLAYED IN THE TWO-DIGIT DISPLAY?

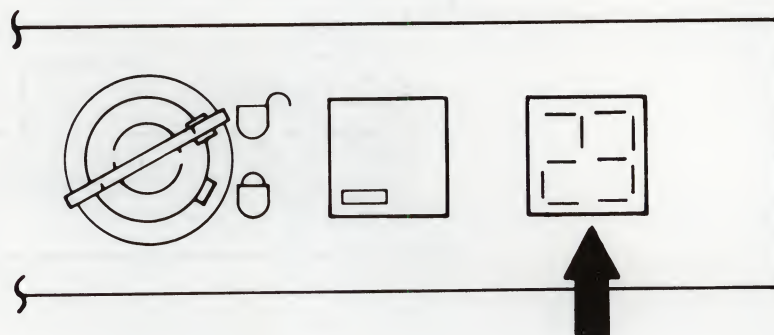
---

- YES** Set the power switch on the system unit to Off, then go to "Step 8" on page 3-9810-8.
- NO** Set the power switch on the system unit to Off.
1. Remove the memory board from slot C.
  2. Look at the memory board type you recorded, then install the original memory board in slot C.
  3. Go the the next page.

---

## Step 6

1. Exchange the processor board in slot A.
  2. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  3. Wait 2 minutes, then answer the following question.
- 



---

### IS "23" DISPLAYED IN THE TWO-DIGIT DISPLAY?

---

- YES**     Set the power switch on the system unit to Off, then go to "Step 8" on page 3-9810-8.
- NO**     Set the power switch on the system unit to Off.
1. Remove the processor board from slot A.
  2. Exchange the system board.
  3. Go to "Step 8" on page 3-9810-8.

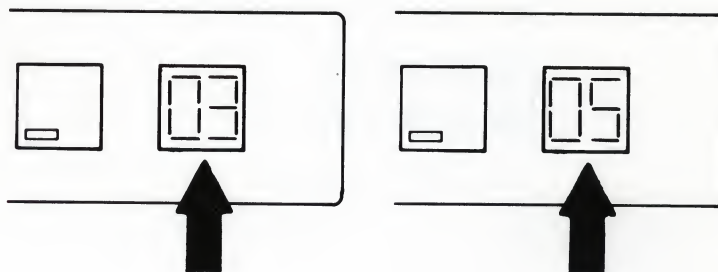


---

## Step 7

One of the boards removed from slots B or D is failing.

1. Set the power switch on the system unit to Off.
  2. Install one of the boards removed from slots B or D.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Wait 2 minutes, then answer the following question.
- 



---

**IS "03" OR "05" DISPLAYED IN THE TWO-DIGIT DISPLAY?**

---

**NO** Repeat this procedure.

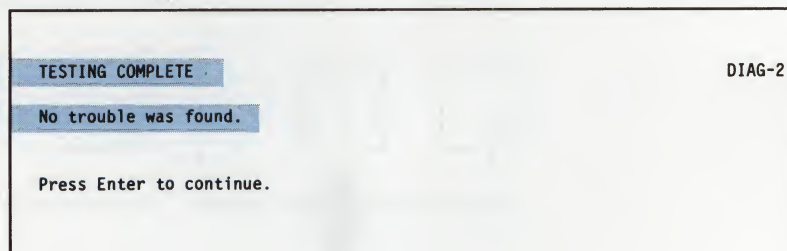
**YES** Set the power switch on the system unit to Off.

1. The last board installed is failing, exchange the failing board.
2. Go to "Step 8" on page 3-9810-8.

---

## Step 8

1. Look at the type and slot positions you recorded, and install the boards and adapters you removed.
  2. Set the power switch on the system unit to Off.
  3. Do the "Top Cover Replacement" on page 4-13.
  4. Set the power switch on the system unit to On.
  5. Follow the instructions on the menus to run the System Checkout. If needed, see page 2-16.
- 



---

### WERE YOU ABLE TO LOAD AND RUN THE "SYSTEM CHECKOUT" AND DID THE "NO TROUBLE WAS FOUND" MESSAGE DISPLAY?

---

- NO** If you were unable to run the System Checkout because the system stopped with 03 or 05 displayed in the two-digit display, go to "Unresolved Problem PIC 0060" on page 3-0060-1 otherwise, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.
- YES** This completes the repair.

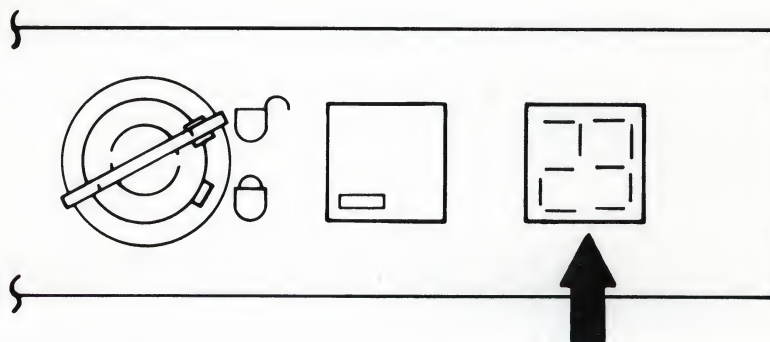
---

## POST Error 23 PIC 9840

Use this PIC to analyze the 984 SRA number.

### Step 1

1. Do the "Top Cover Removal" on page 4-12.
2. Remove the adapters from slots 1 through 5 and record the type and slot position of each.
3. Plug the external power cable into the outlet.
4. Set the power switch on the system unit to On.
5. Wait 2 minutes, then answer the following question.



---

**IS "23" DISPLAYED IN THE TWO-DIGIT DISPLAY?**

---

**NO**      Go to "Step 3" on page 3-9840-3.

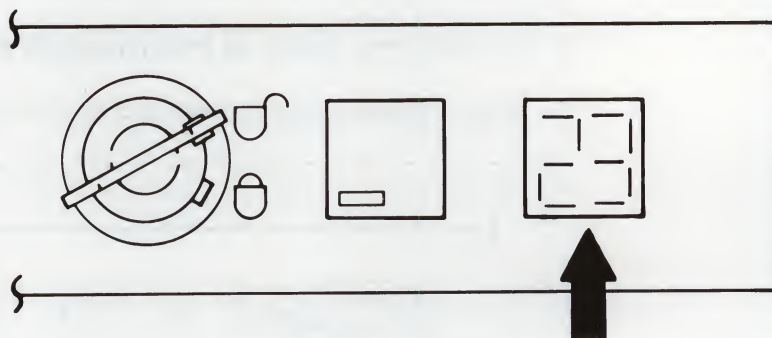
**YES**      Continue on the next page.



---

## Step 2

1. Set the power switch on the system unit to Off.
  2. Exchange the adapter for the fixed-disk and diskette drives.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Wait 2 minutes, then answer the following question.
- 



---

### IS "23" DISPLAYED IN THE TWO-DIGIT DISPLAY?

---

**NO** Set the power switch on the system unit to Off, then go to "Step 4" on page 3-9840-4.

**YES** Set the power switch on the system unit to Off.

1. Exchange the system board.
2. Go to "Step 4" on page 3-9840-4.

---

### Step 3

One of the removed adapters is failing.

1. Set the power switch on the system unit to Off.
  2. Install one of the adapters beginning with the display adapter.
  3. Insert the Diagnostics 1 (DIAG-1) diskette in the diskette drive and close the drive.
  4. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  5. Wait 4 minutes, then answer the following question.
- 

#### **ARE THE "DIAGNOSTIC OPERATING INSTRUCTIONS" DISPLAYED?**

---

**YES**      Repeat the above steps.

**NO**        Set the power switch on the system unit to Off.

1. The last adapter installed or a FRU attached to it is failing.  
Use the removal and replacement procedures in the section for the type adapter and exchange the adapter or FRU attached to it.
2. Continue on the next page.

---

## Step 4

1. Look at the type and slot positions you recorded, and install the boards and adapters you removed.
  2. Set the power switch on the system unit to Off.
  3. Do the "Top Cover Replacement" on page 4-13.
  4. Set the power switch on the system unit to On.
  5. Follow the instructions on the menus to run the System Checkout. If needed, see page 2-16.
- 

TESTING COMPLETE	DIAG-2
No trouble was found.	
Press Enter to continue.	

---

### WERE YOU ABLE TO LOAD AND RUN THE "SYSTEM CHECKOUT" AND DID THE "NO TROUBLE WAS FOUND" MESSAGE DISPLAY?

---

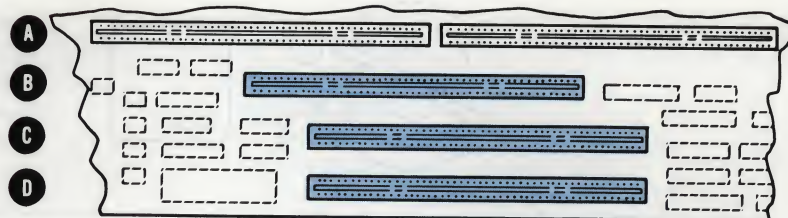
- NO** If you were unable to run the System Checkout because the system stopped with 23 displayed in the two-digit display, go to "Unresolved Problem PIC 0060" on page 3-0060-1 otherwise, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.
- YES** This completes the repair.



## POST Errors 5c PIC 9870

### Step 1

1. Do the Side Cover Removal for an IBM 6150 or the Top Cover Removal for an IBM 6151.
2. Plug the external power cable to the power supply and outlet.

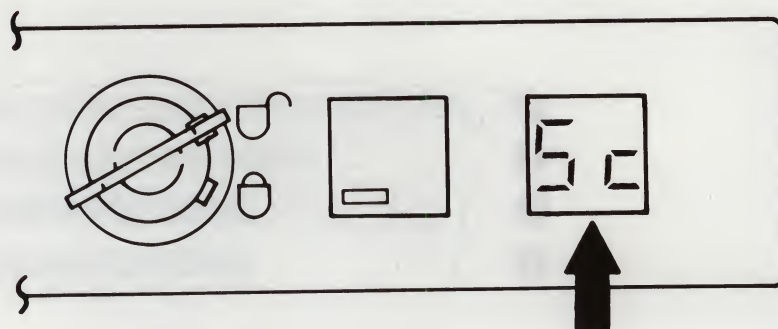


### IS THERE A BOARD IN SLOT B, C, OR D?

- NO**      Go to "Step 3" on page 3-9870-3.
- YES**      Continue on the next page.

## Step 2

1. Remove the boards from slots B, C, and D, then record the type and slot position.
2. Set the power switch on the system unit to On.
3. Wait 2 minutes, then answer the following question.



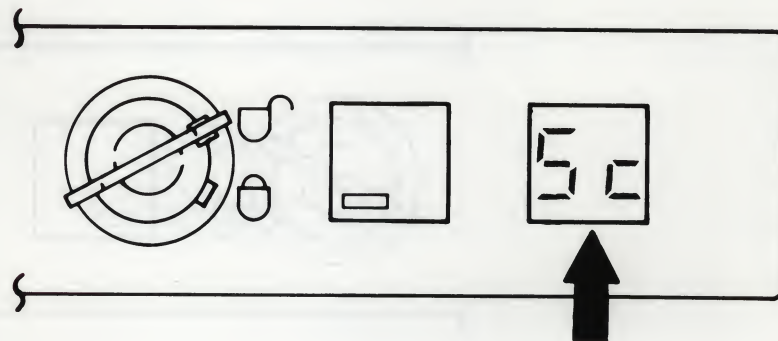
**IS "5c" DISPLAYED IN THE TWO-DIGIT DISPLAY?**

**NO** Go to "Step 4" on page 3-9870-4.

**YES** Continue on the next page.

### Step 3

1. Exchange the processor board in slot A.
2. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
3. Wait 2 minutes, then answer the following question.



#### IS "5c" DISPLAYED IN THE TWO-DIGIT DISPLAY?

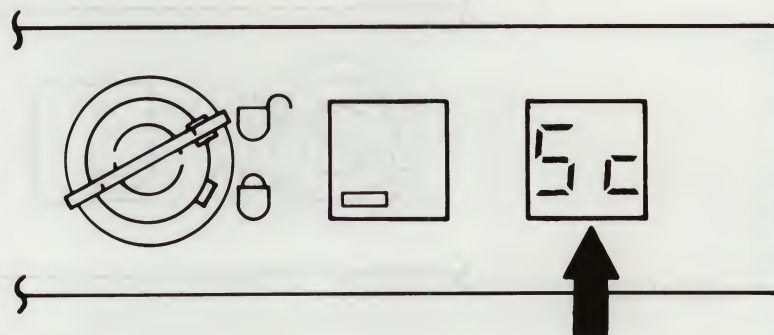
- |            |  |
|------------|--|
| <b>YES</b> | Set the power switch on the system unit to Off, then go to "Unresolved Problem PIC 0060" on page 3-0060-1. |
| <b>NO</b>  | Set the power switch on the system unit to Off, then go to "Step 5" on page 3-9870-5.                      |



#### Step 4

One of the boards removed from slots B, C, or D is failing.

1. Set the power switch on the system unit to Off.
2. Install one of the boards removed from slots B, C, or D.
3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
4. Wait 2 minutes, then answer the following question.



**IS "5c" DISPLAYED IN THE TWO-DIGIT DISPLAY?**

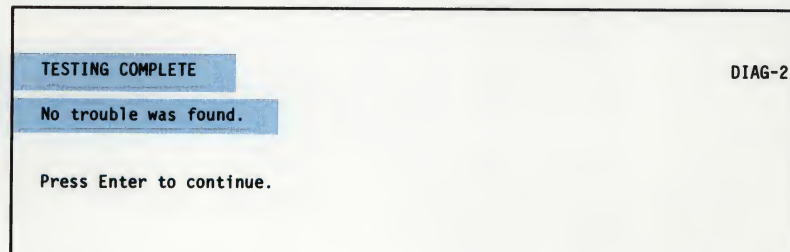
**NO** Repeat this procedure.

**YES** Set the power switch on the system unit to Off.

1. The last board installed is failing, exchange the failing board.
2. Go to "Step 5" on page 3-9870-5.

## Step 5

1. Look at the type and slot positions you recorded, and install the boards and adapters you removed.
2. Do the Side Cover Replacement or the Top Cover Replacement in Section 4.
3. Set the power switch on the system unit to On.
4. Follow the instructions on the menus to run the System Checkout. If needed, see page 2-16.



### **WERE YOU ABLE TO LOAD AND RUN THE "SYSTEM CHECKOUT" AND DID THE "NO TROUBLE WAS FOUND" MESSAGE DISPLAY?**

- NO** If you were unable to run the System Checkout because the system stopped with 5c displayed in the two-digit display, go to "Unresolved Problem PIC 0060" on page 3-0060-1 otherwise, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.
- YES** This completes the repair.





---

## Undetermined Problem PIC 9860

Use this PIC to analyze the following symptoms:

- SRA number 986.
- Diagnostic error messages displayed while running diagnostics.
- Numbers are displayed in the two-digit display after the DIAGNOSTIC OPERATING INSTRUCTIONS menu has displayed.
- Diagnostic loops and hangs with nothing displayed in the two-digit display.
- The keyboard will not respond while running diagnostics.
- You cannot exit or end a test.

### Step 1

Look at the bottom of the display.

---

### DID THE "DIAGNOSTIC ERROR" MESSAGE DISPLAY?

**YES**     Go to "Step 3" on page 3-9860-3.

**NO**     Continue on the next page..

---

## Step 2

A failing keyboard may cause one of the following conditions:

- Unable to exit the keyboard test by pressing the n and Enter keys
  - Unable to select a certain item from a menu
  - Unable to stop or exit a test by pressing the End key.
- 

### IS THE PROBLEM ONE OF THE ABOVE?

**NO**      Go to "Step 6" on page 3-9860-6.

**YES**      Record SRN 16-780, then go to "Step 3" on page 3-0010-4.

---

**Step 3**

Look at the bottom of the display.

---

**DID THE MESSAGE “DIAGNOSTIC ERROR - Diskette error”  
DISPLAY?**

---

**NO**      Go to “Step 6” on page 3-9860-6.

**YES**      Continue on the next page..



---

## Step 4

The problem may be the diskettes.

1. Get a different set of diagnostic diskettes.
  2. Try to run the failing diagnostic test.
  3. When the test completes or stops, look at the bottom of the display.
- 

### **DID THE MESSAGE "DIAGNOSTIC ERROR - Diskette error" DISPLAY?**

---

- |            |   |
|------------|---|
| <b>NO</b>  | Replace the failing set of diagnostic diskettes. Go to "Problem Determination Procedure PIC 0030" on page 3-0030-1 and get another SRN. |
| <b>YES</b> | Continue on the next page..   |

---

## Step 5

Some Diagnostic Error messages occur when the Run Test Multiple Times option is selected.

---

**WERE YOU RUNNING THE DIAGNOSTIC PROGRAMS WHILE  
USING THE "RUN TEST MULTIPLE TIMES" OPTION?**

---

**YES**      Disregard the Diagnostic Error message and start the test again.

**NO**        Continue on the next page.

---

## Step 6

Some tests require that specific FRUs be installed before the test is displayed in the ADVANCED DIAGNOSTIC SELECTION menu.

Look at the test that failed.

---

### IS A SPECIFIC ADAPTER REQUIRED TO RUN THE FAILING TEST?

**NO**      Go to "Step 8" on page 3-9860-8.

**YES**      Continue on the next page.



---

## Step 7

If any, exchange the FRUs that are required to run the failing diagnostic test. Use the removal and replacement procedures in the section for that FRU.

Try the failing diagnostic test again.

---

### **DID THE SAME PROBLEM OCCUR?**

---

- NO**      Go to "Step 11" on page 3-9860-11.
- YES**     Remove the new FRUs and install the old FRUs again, then continue on the next page.

---

## Step 8

1. Do the "Top Cover Removal" on page 4-12.
2. Remove the boards from system board slots B and D.
3. Remove the adapters from adapter slots 1 through 5 except the display adapter and any specific FRUs required to run the failing test.
4. Plug the external power cable into the outlet.
5. Insert the Diagnostics 1 (DIAG-1) diskette in the diskette drive and close the drive.
6. Set the power switch on the system unit to On.
7. Try the failing procedure again.

If you get any SRN other than SRN number 16-986, go to "Start of Call PIC 0010" on page 3-0010-1.

---

### **DID THE SAME PROBLEM OCCUR?**

**NO**      Go to "Step 10" on page 3-9860-10.

**YES**      Continue on the next page.

---

## Step 9

One of the remaining FRUs is failing.

1. Set the power switch on the system unit to Off.
  2. Exchange and test the FRUs one at a time in the following order; the processor board, the system board, the adapter for the fixed-disk and diskette drives, the display adapter, the diskette drive, then the memory board in slot C.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Try the failing procedure.
- 

## **DID YOU FIND THE PROBLEM?**

---

- NO** Try a new set of diagnostic diskettes. If the problem still occurs, contact your service support person. Otherwise, go to "Step 11" on page 3-9860-11.
- YES** Go to "Step 11" on page 3-9860-11.

---

## Step 10

One of the removed boards or adapters is failing.

1. Set the power switch on the system unit to Off.
  2. Install one of the boards or adapters.
  3. Be sure the power has been off 30 seconds, then set the power switch on the system unit to On.
  4. Try the failing procedure.
- 

### DID THE SAME PROBLEM OCCUR?

**NO** Repeat the above steps.

**YES** Set the power switch on the system unit to Off.

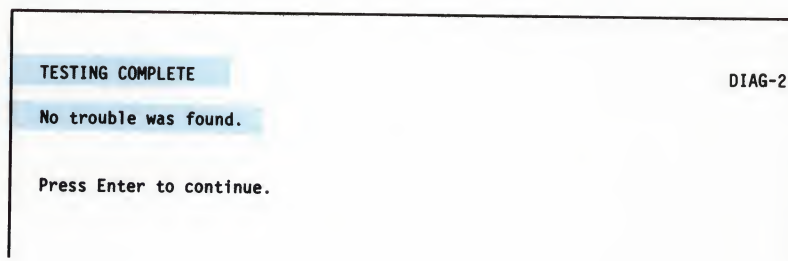
1. The last adapter you installed or a FRU attached to that adapter is failing. Use the removal and replacement procedures in the section for that adapter and exchange the adapter or the attached FRU.
2. Continue on the next page.



---

## Step 11

1. Look at the type and slot positions you recorded, and if any, install the boards and adapters you removed.
  2. Unplug the external power cable from the outlet.
  3. Do the "Top Cover Replacement" on page 4-13.
  4. Set the power switch on the system unit to On.
  5. Follow the instructions on the menus to run the System Checkout. If needed, see page 2-16.
- 



### **WERE YOU ABLE TO LOAD AND RUN THE "SYSTEM CHECKOUT" AND DID THE "NO TROUBLE WAS FOUND" MESSAGE DISPLAY?**

- NO** If the same failure occurs, contact your service support person, otherwise, go to "Problem Determination Procedure PIC 0030" on page 3-0030-1.
- YES** This completes the repair.



---

## **Section 4. Removal and Replacement Procedures**



---

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---

## About this Section

This section contains removal and replacement procedures that are not specific to one adapter, diskette drive, fixed-disk drive, system memory board, or processor board. Follow these procedures for the type of device you are removing or installing. Use the contents list on the preceding page to select the procedure for your device.

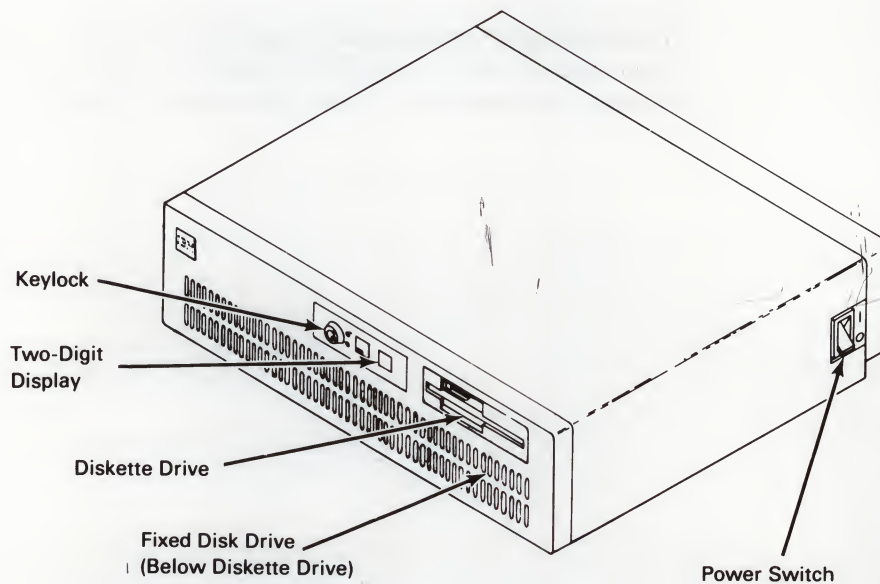
The removal or replacement procedure may direct you to the section for your type device for detailed information about switch settings, jumper settings, or terminator resistor installation or removal.

---

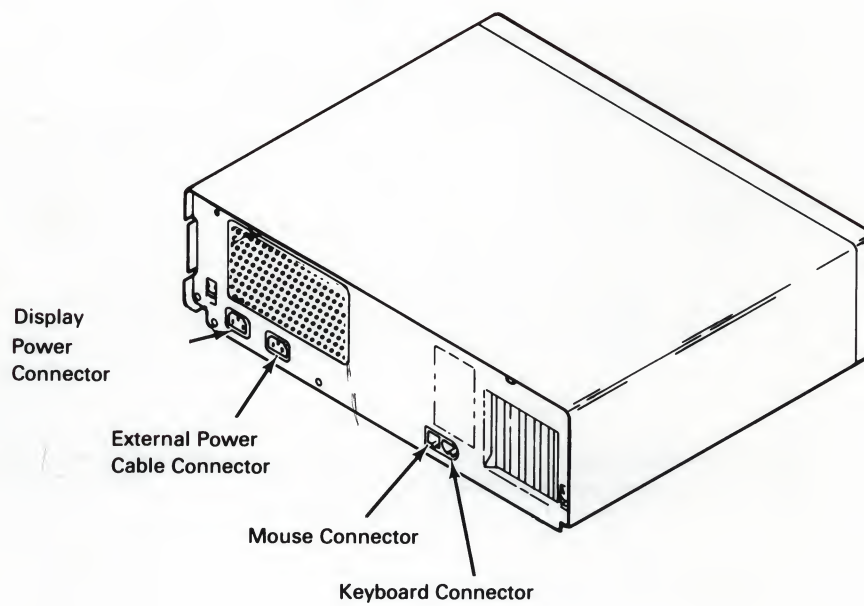
## System Unit Locations

Use the following views of the system unit to locate the diskette drive, fixed-disk drive, connectors, and system board slot positions.

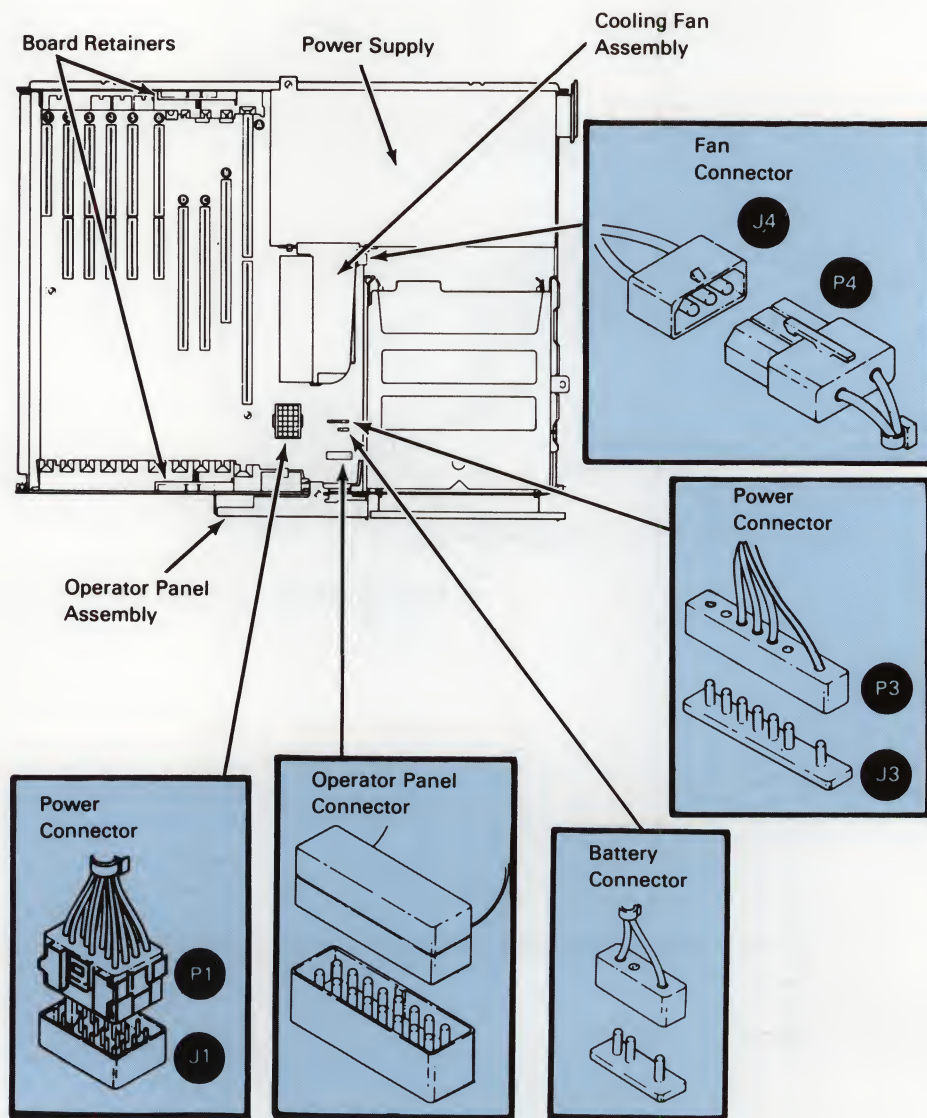
### Front View With Covers



## Rear View Without Rear Cover

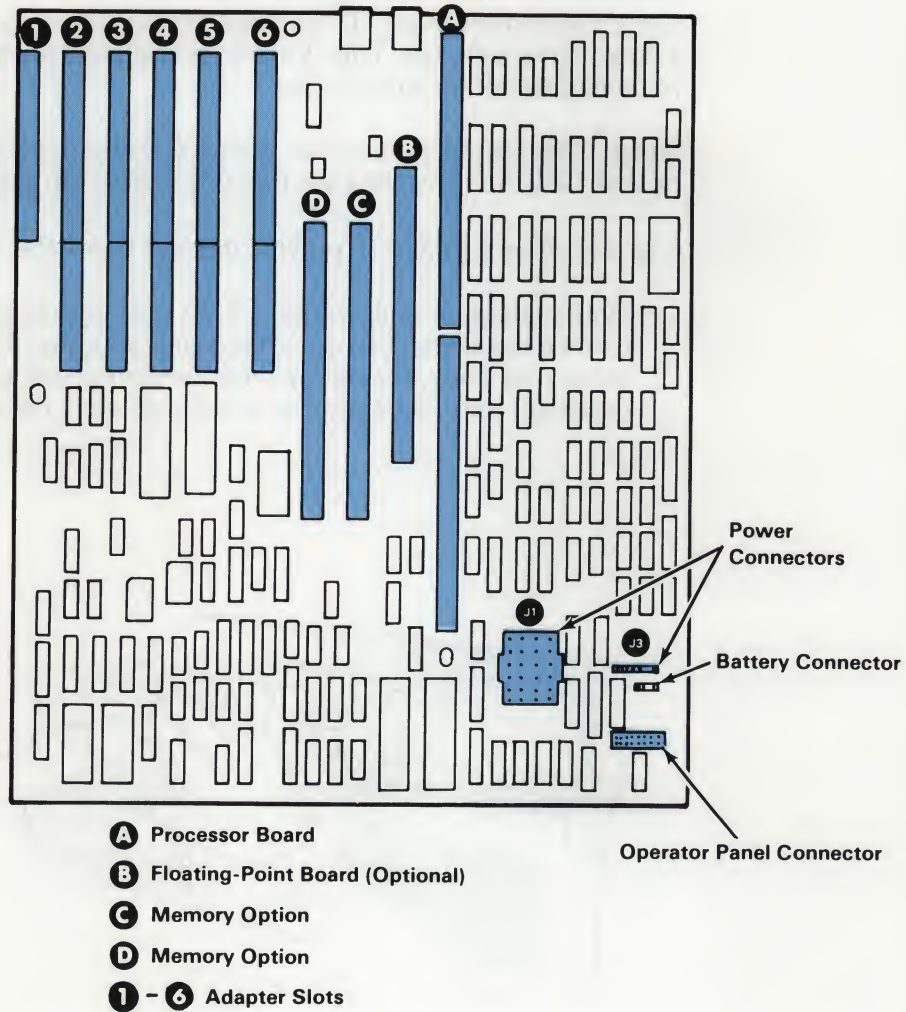


## Top View Without Covers





# System Board



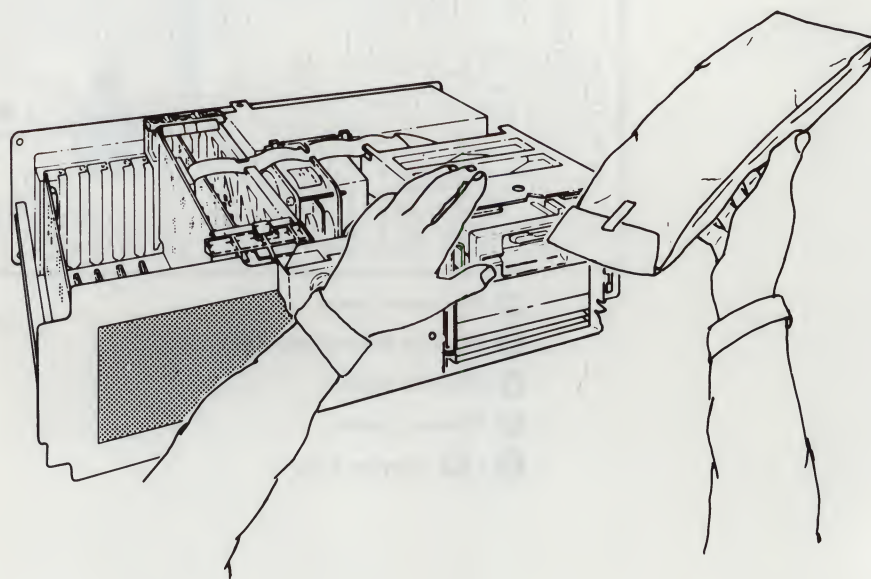
## Handling Static-Sensitive Devices

Some devices that make up your IBM 6151 System Unit can be damaged by electrostatic discharges. To prevent this damage, the options are wrapped in a conductive, antistatic bag. Certain precautions must be taken before removing an option from its bag.

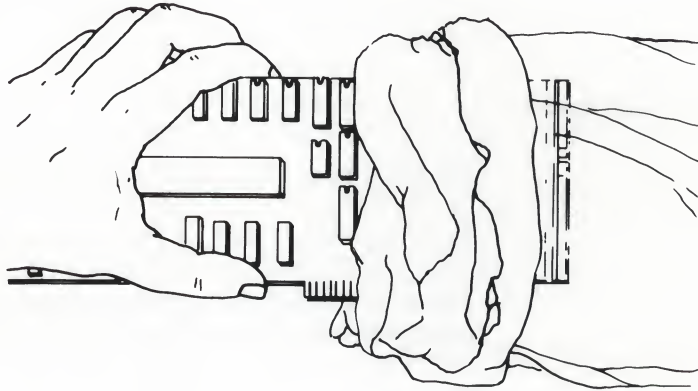
**Note:** The adapters, processor board, floating-point board, system memory boards, diskette drive, and the fixed-disk drive are static-sensitive devices.

Use the following steps to prevent damage to a static-sensitive device.

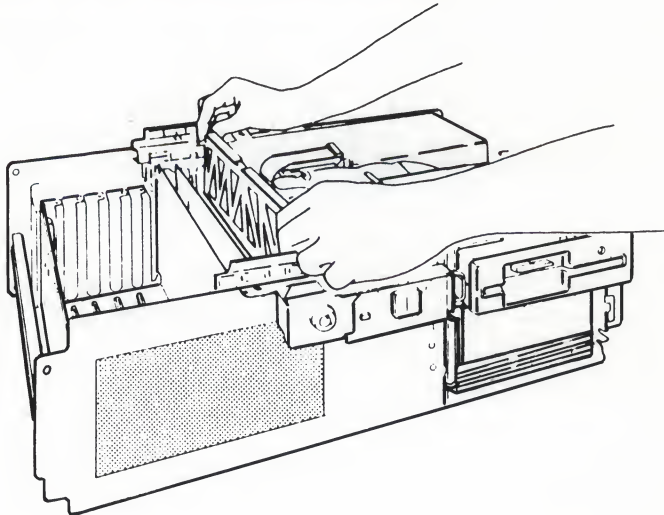
1. Hold the option (still wrapped in its antistatic bag) in one hand and touch a metal part of your system unit with the other hand. This will place your body, the option, and the system unit at the same ground potential, thus preventing an accidental static discharge.



- 
2. Carefully remove the option from its antistatic bag. Be sure to grasp circuit boards by the edges only; do not touch the component pins or solder joints. Grasp diskette drives by their frames to avoid touching the electronics board.



3. When inserting an option adapter into the system board, hold the adapter by its top edge or upper corners.





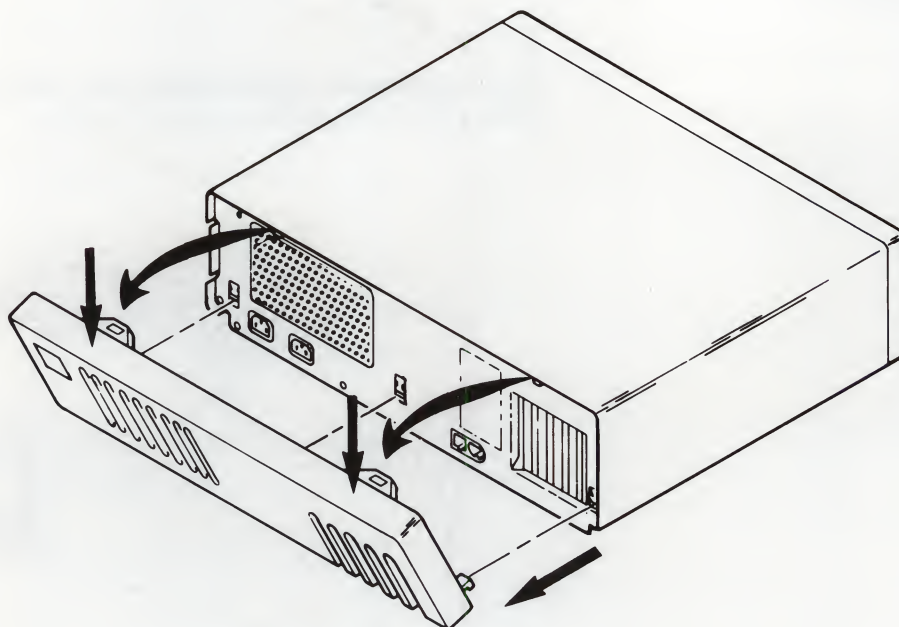
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## Removal and Replacement Procedures

The removal and replacement procedures on the following pages are for the components of the system unit and devices installed within or attached to the system unit.

### Rear Cover Removal

1. Set the power switches of the attached devices to Off.
  2. Set the power switch of the system unit to Off.
  3. Press down on the rear cover to unhook it, then pivot the top of the cover out from the system unit to remove it.
- 

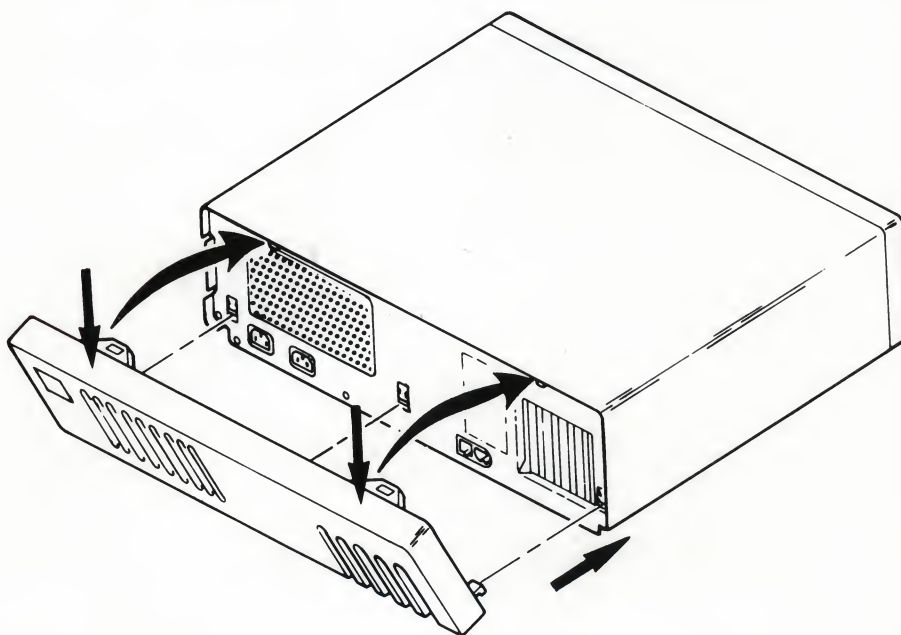




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## Rear Cover Replacement

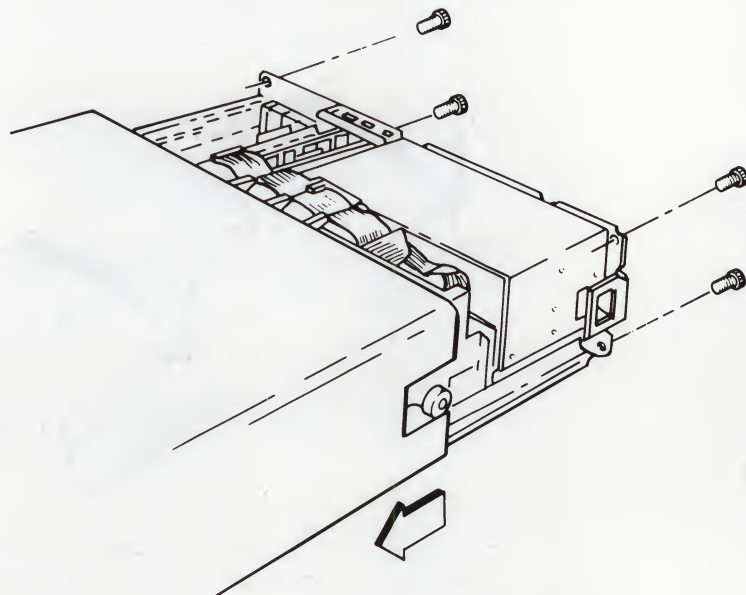
1. Insert the lower cover latch arms into the latch brackets. Push down on the rear cover while you move it into position, then let up on the cover to hook it.
  2. Set the power switches of the attached devices to On.
  3. Set the power switch of the system unit to On.
- 



---

## Top Cover Removal

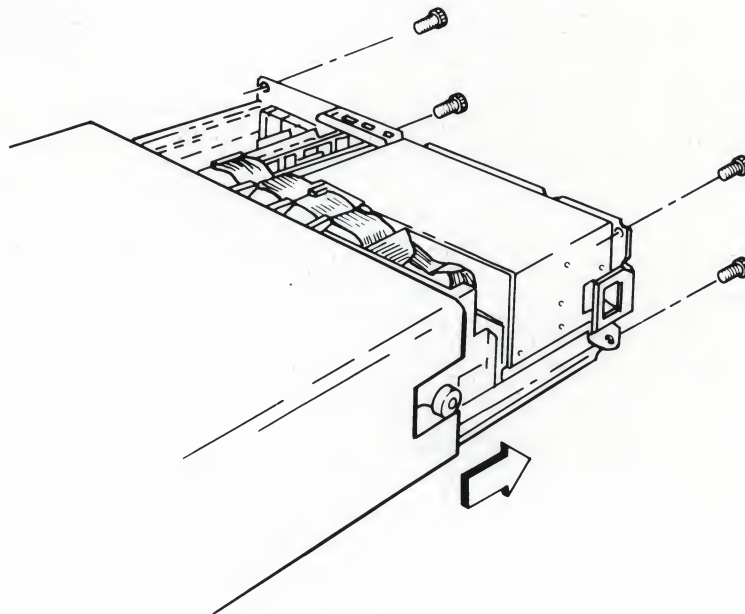
1. Do the "Rear Cover Removal" on page 4-10.
  2. Unplug the external power cables to the attached devices at the outlet.
  3. Unplug the external power cable to the system unit at the outlet.
  4. Set the keylock to Unlock, then remove the key.
  5. Remove the four cover screws.
  6. Slide the top cover off the front of the system unit.
- 



---

## Top Cover Replacement

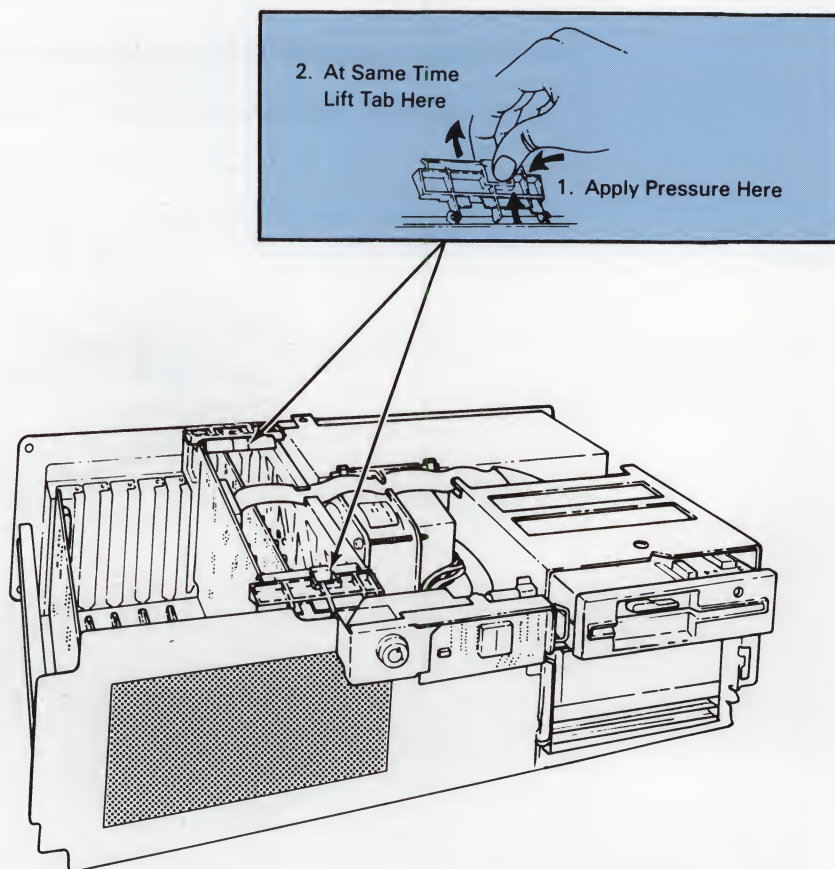
1. Slide the top cover on the system unit from the front. Use care not to damage the cables to the fixed-disk and diskette drives.
  2. Install the four cover screws.
  3. Do the "Rear Cover Replacement" on page 4-11.
  4. Plug in the external power cables of the attached devices to the outlet.
  5. Plug in the external power cable of the system unit to the outlet.
- 



---

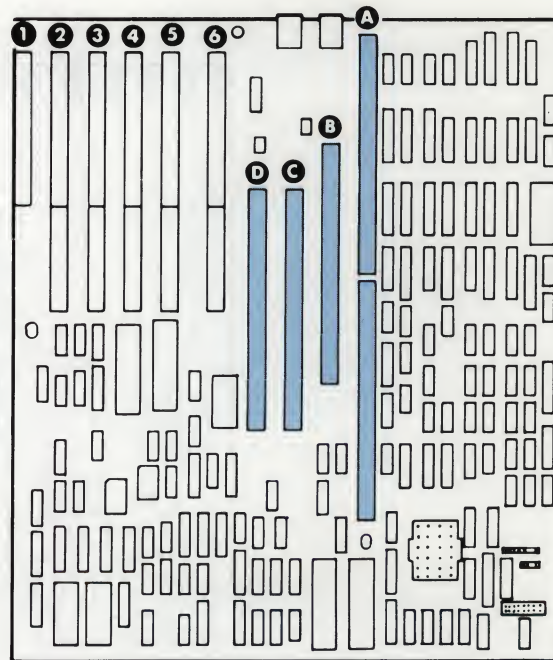
## Processor, Floating-Point, or System Memory Removal

1. Do the "Top Cover Removal" on page 4-12.
  2. Open the two board retainers.
- 





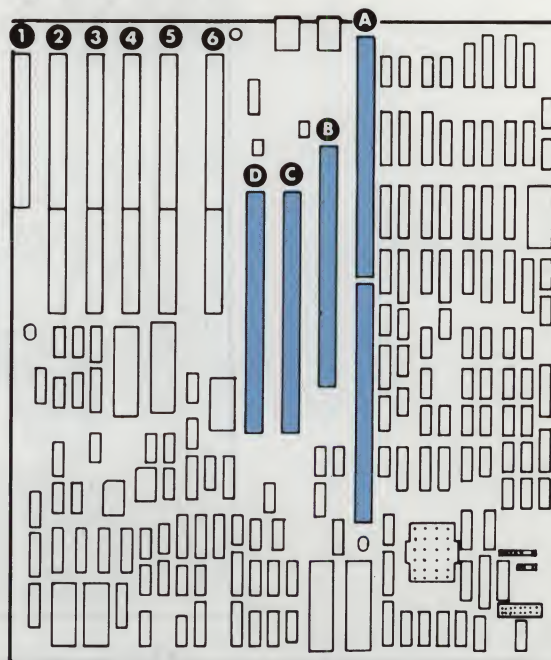
3. Remove the fixed-disk and diskette adapter from slot 6 and place it on top of the system unit with the cables attached.
4. Remove the desired board.
5. Record the type and slot position.



- A** Processor Board
- B** Floating-Point Board
- C** Memory Option
- D** Memory Option

## Processor, Floating-Point, or System Memory Replacement

1. Look at the slot number you recorded, then align the board with the slot and press into position.
2. Be sure the cables are securely connected, then install the fixed-disk and diskette adapter in slot 6.

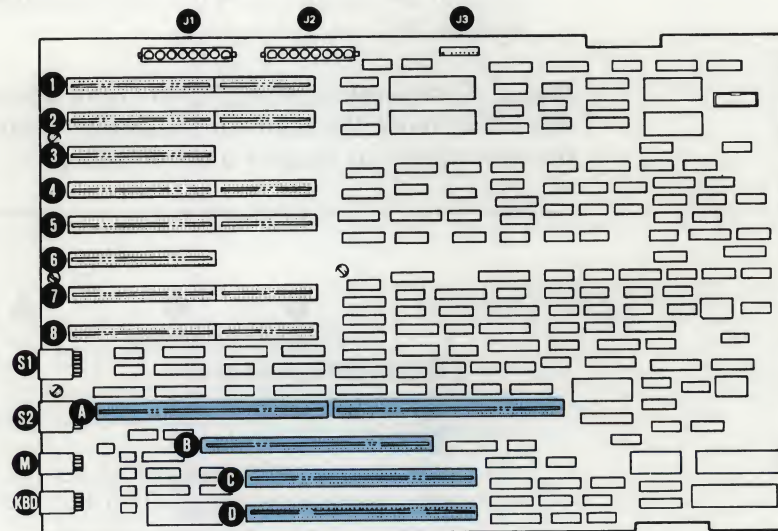


- A** Processor Board
- B** Floating-Point Board
- C** Memory Option
- D** Memory Option

## Processor, Floating-Point, or System Memory Replacement

1. Look at the slot number you recorded, then align the board with the slot and press into position.
2. Do the "Side Cover Replacement" on page 4-15.

**Reminder to Service Representative:** After you exchange the Processor Board, notify the customer that the unique identification number of the system unit has changed. The customer needs to update the authorization for any program that uses the identification number for access.



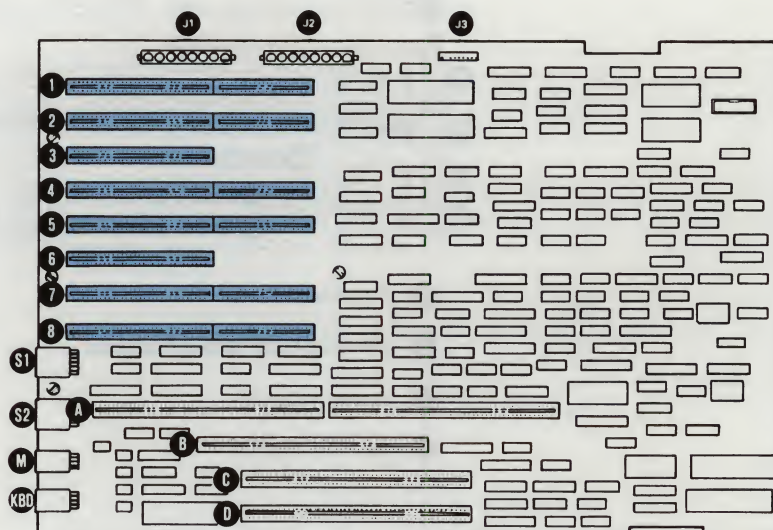
- A** Processor Board
- B** Floating-Point Board (Optional)
- C** Memory Option
- D** Memory Option



## Adapter Removal

1. Do the "Side Cover Removal" on page 4-14.
2. Record the adapter slot position.
3. Disconnect any external cables from the desired adapter.
4. Remove the adapter mounting screw.
5. Remove the adapter.
6. Disconnect any internal cables from the adapter.
7. If the adapter has jumpers or switches, record the settings. If needed, refer to the jumper or switch settings information for the adapter in Section 9.

**Note:** Some options and adapters have optional pluggable features. You can either move the optional pluggable feature to the new FRU or be sure the new option or adapter has it installed.

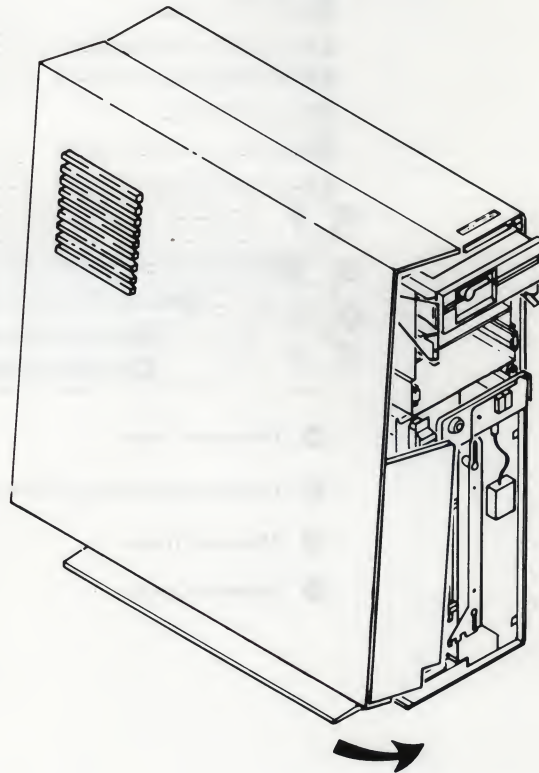




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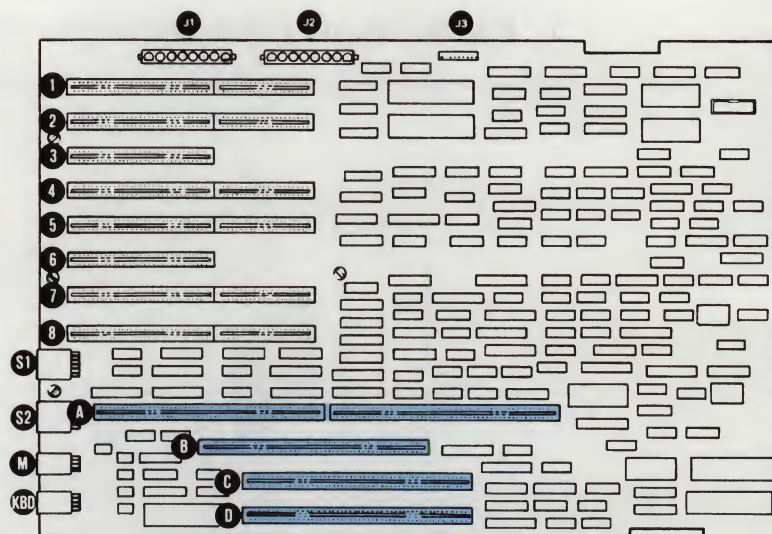
## Side Cover Replacement

1. Hook the upper cover arms under the edge of the system unit. Push the lower end of the cover into position.
  2. Connect the external power cable and the display power cable to the power supply.
  3. Do the "Rear Cover Replacement" on page 4-13.
  4. Do the "Front Cover Replacement" on page 4-11.
  5. Plug the external power cable into the outlet.
- 



## Processor, Floating-Point, or System Memory Removal

1. Do the "Side Cover Removal" on page 4-14.
2. Remove the desired board.
3. Record the type and slot position.

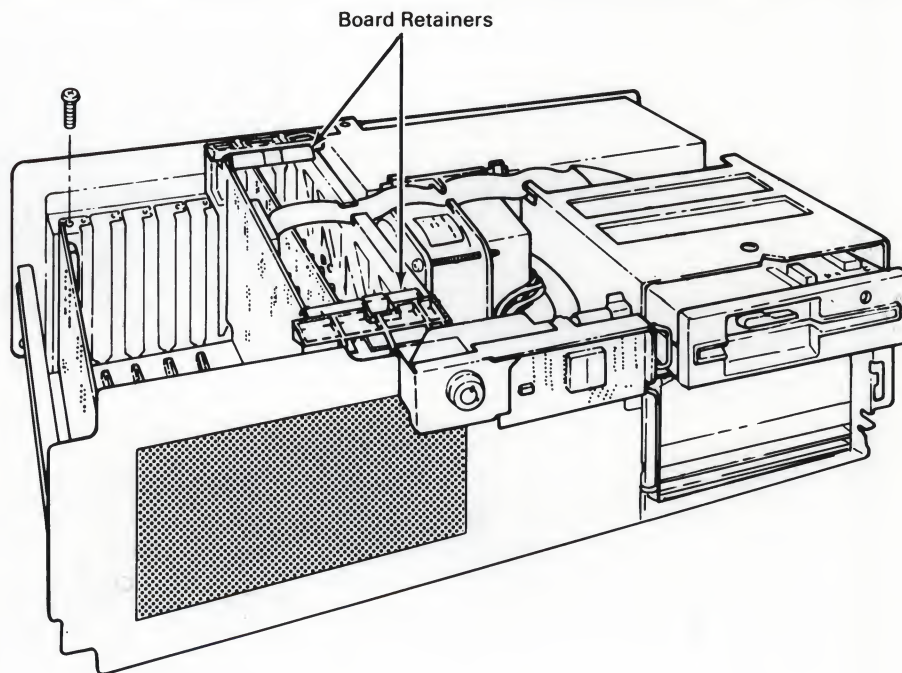


- A** Processor Board
- B** Floating-Point Board (Optional)
- C** Memory Option
- D** Memory Option

- 
3. Close the two board retainers.
  4. Do the "Top Cover Replacement" on page 4-13.

**Reminder to Service Representative:** After you exchange the Processor Board, notify the customer that the unique identification number of the system unit has changed. The customer needs to update the authorization for any program that uses the identification number for access.

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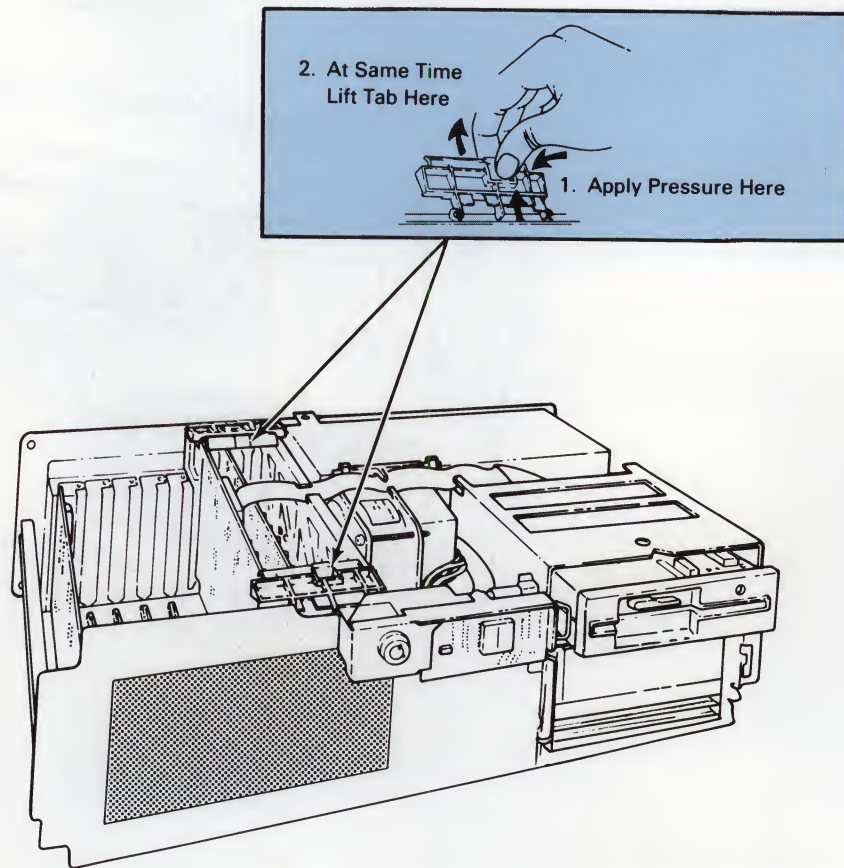




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## Adapter Removal

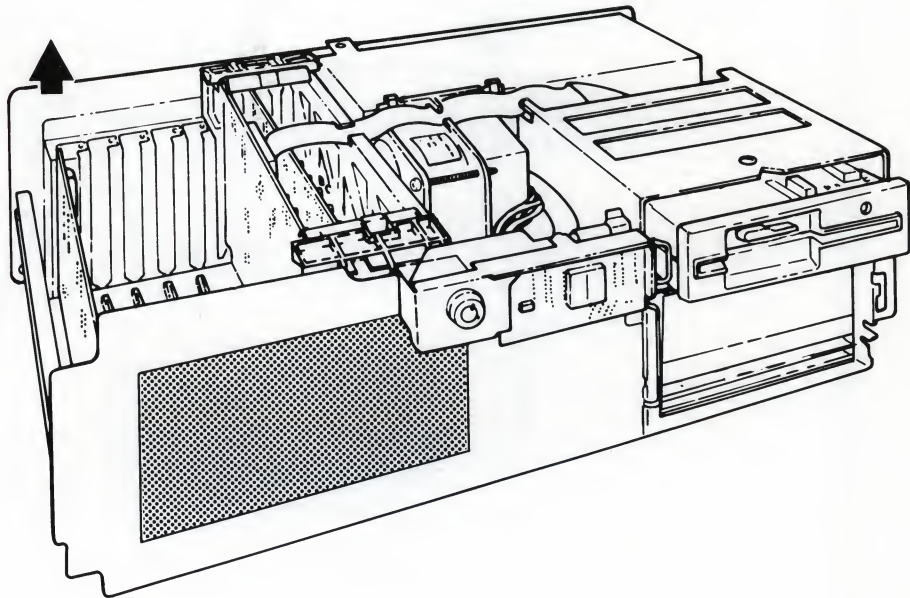
1. Do the "Top Cover Removal" on page 4-12.
  2. If present, disconnect the external cables.
  3. Remove the adapter mounting screw or open the two board retainers.
- 



- 
4. Remove the adapter.
  5. If present, disconnect the internal cables.
  6. Record the adapter slot position.
  7. If the adapter has jumpers or switches, record their settings. If needed, refer to the jumper or switch settings information for the adapter in Section 9.

**Note:** Some options and adapters have optional pluggable features. You can either move the optional pluggable feature to the new FRU or be sure the new option or adapter has it installed.

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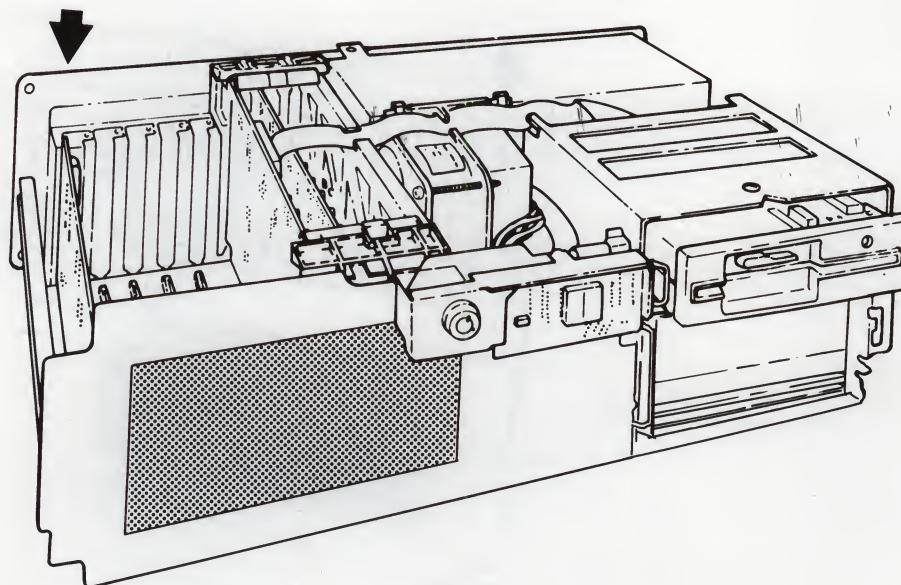


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## Adapter Replacement

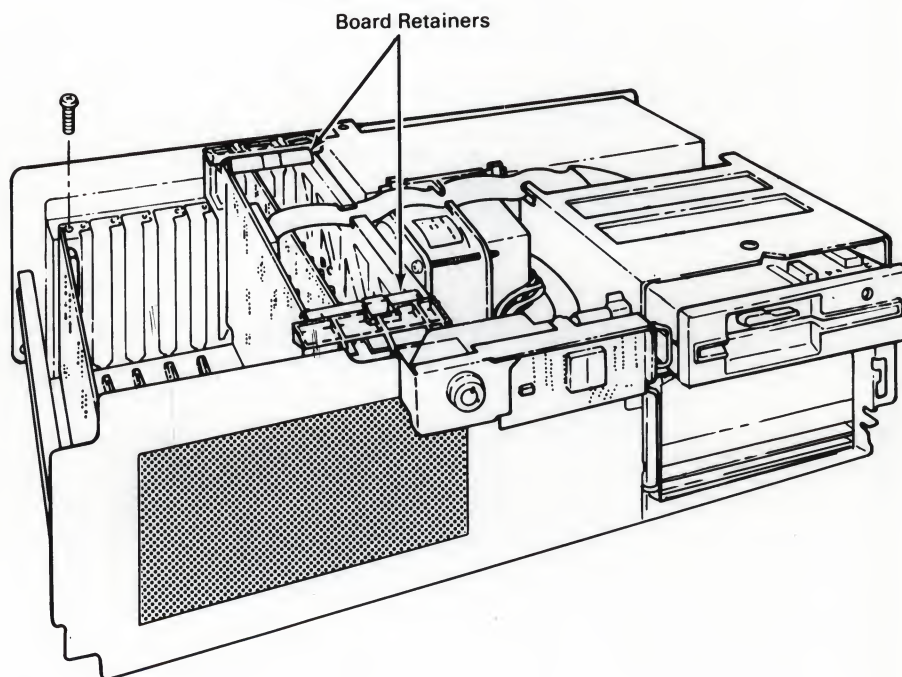
**Note:** Some options and adapters have optional pluggable features. You can either move the optional pluggable feature to the new FRU or be sure the new option or adapter has it installed.

1. Look at the jumper or switch settings you recorded, then set the jumpers or switches. If needed, refer to Section 9.
2. If present, connect the internal cables.
3. Look at the adapter slot number you recorded, then align the adapter with the slot and press into position.





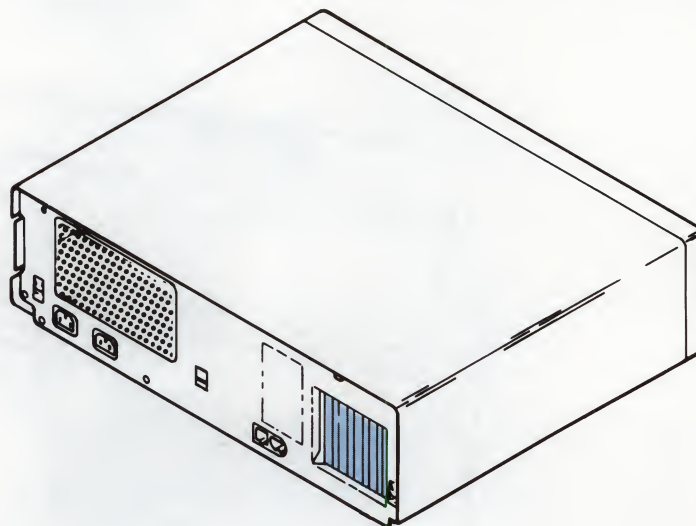
- 
4. Install the adapter mounting screw or close the two board retainers.
  5. If present, connect the external cables.
  6. Do the "Top Cover Replacement" on page 4-13.
- 



---

## Attached Device Removal

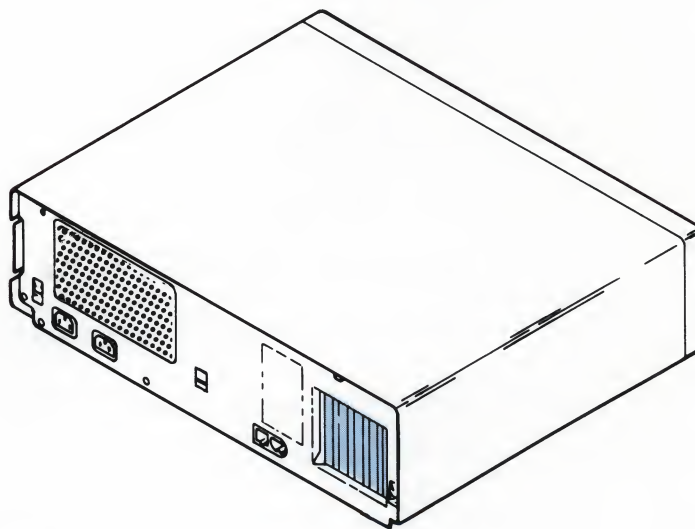
1. Do the “Rear Cover Removal” on page 4-10.
  2. Unplug the external power cable to the attached device.
  3. Disconnect the signal cable to the device from the adapter.
- 



---

## Attached Device Replacement

1. Connect the signal cable for the device to the adapter.
  2. Plug in the external power cable to the attached device.
  3. Do the “Rear Cover Replacement” on page 4-11.
- 





---

## Battery Removal

### DANGER

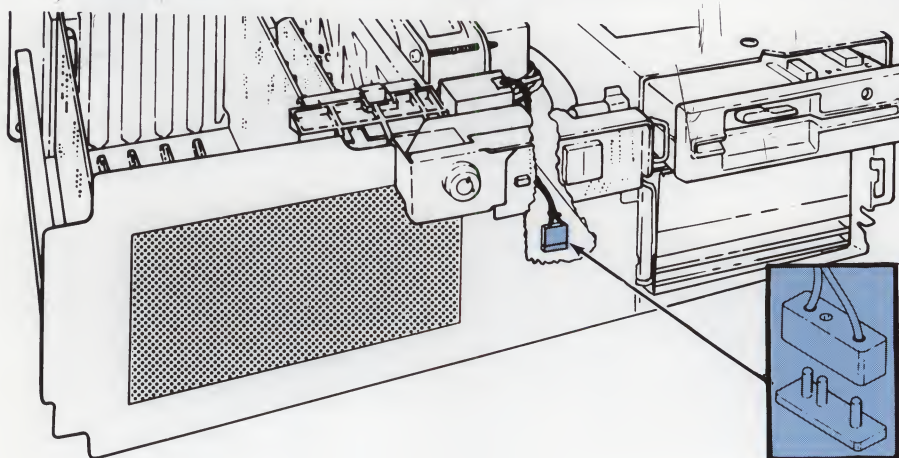
Fire, explosion, and severe burn hazard. Do not recharge, disassemble, heat above 100° C, solder directly to the cell, incinerate, or expose cell contents to water. Keep away from children. Replace with IBM part number 6299201 only or a battery that has been specifically classified by Underwriters Laboratories for use with the IBM 6151 System Unit and is so marked to indicate such classification. Use of another may present risk of fire or explosion.

.....

.....

.....

1. Do the "Top Cover Removal" on page 4-12.
2. Disconnect the battery cable from the system board.
3. Slide the battery up out of the holder.



---

## Battery Replacement

### DANGER

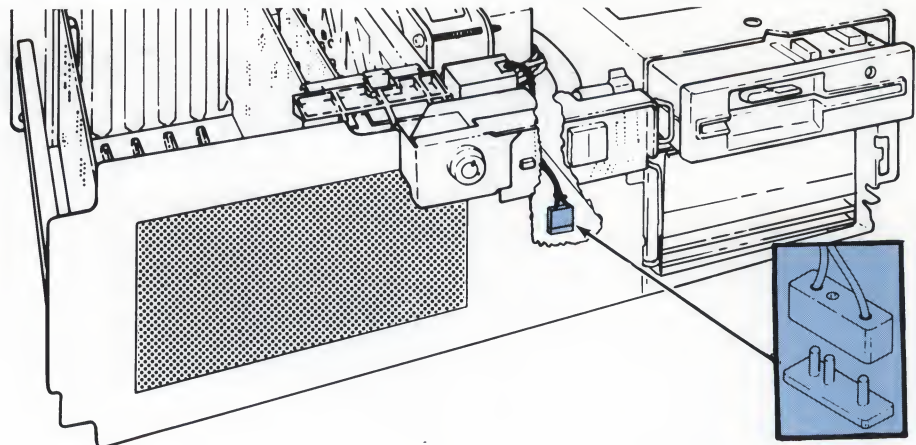
Fire, explosion, and severe burn hazard. Do not recharge, disassemble, heat above 100° C, solder directly to the cell, incinerate, or expose cell contents to water. Keep away from children. Replace with IBM part number 6299201 only or a battery that has been specifically classified by Underwriters Laboratories for use with the IBM 6151 System Unit and is so marked to indicate such classification. Use of another may present risk of fire or explosion.

.....

.....

.....

1. Align the battery with the holder and slide it down into position.
2. Connect the battery cable to the system board.
3. Do the "Top Cover Replacement" on page 4-13.

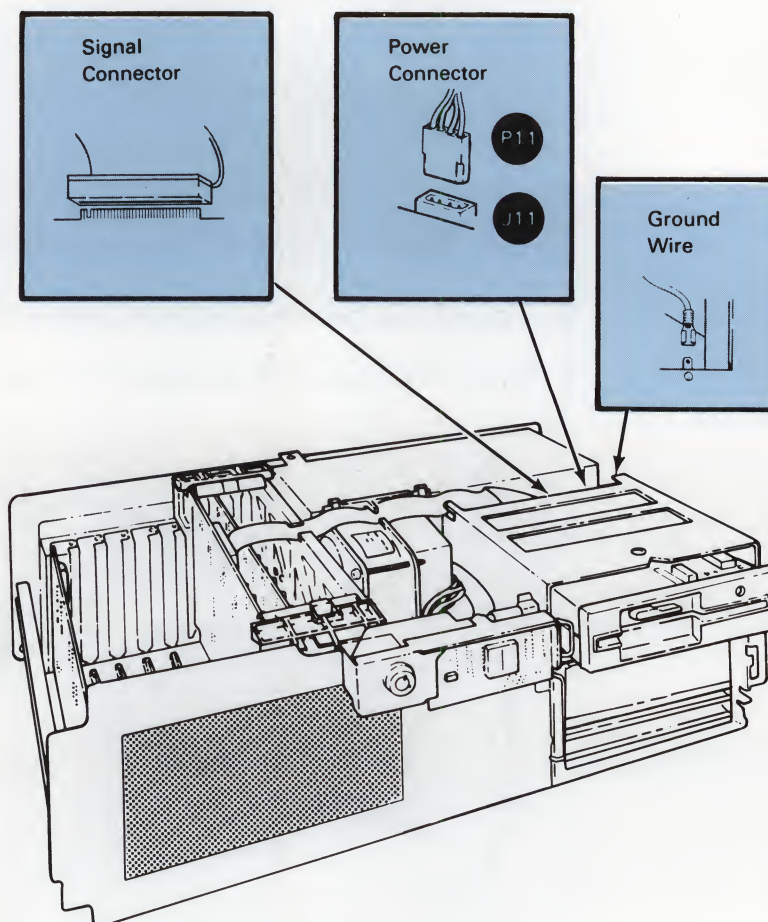


---

## Diskette Drive Removal

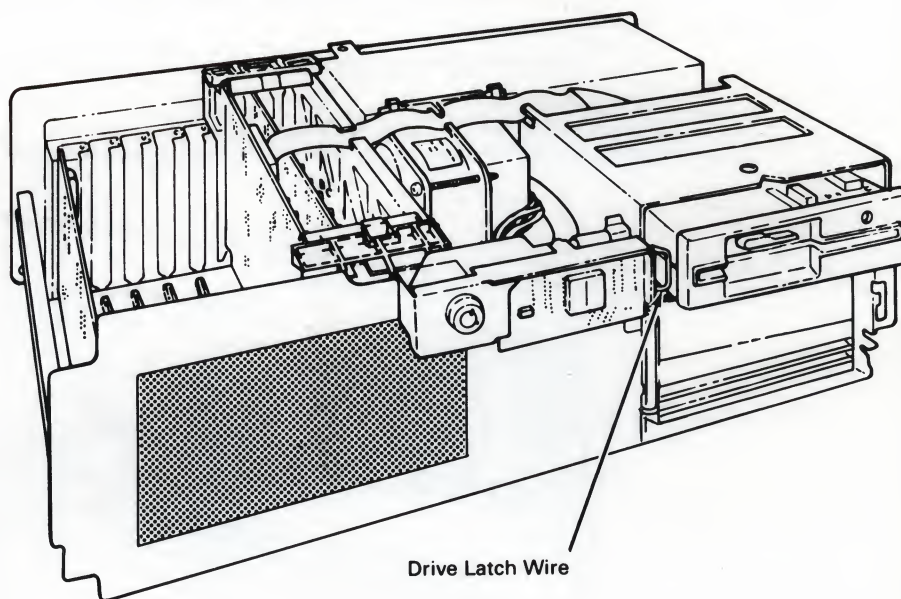
Follow the Handling a Diskette Drive procedures. If needed, see Section 7.

1. Do the "Top Cover Removal" on page 4-12.
  2. Disconnect the ground wire.
  3. Disconnect the power connector.
  4. Disconnect the signal connector.
- 





- 
5. Pull on the latch wire to release the drive, then slide the drive out of the system unit.
- 

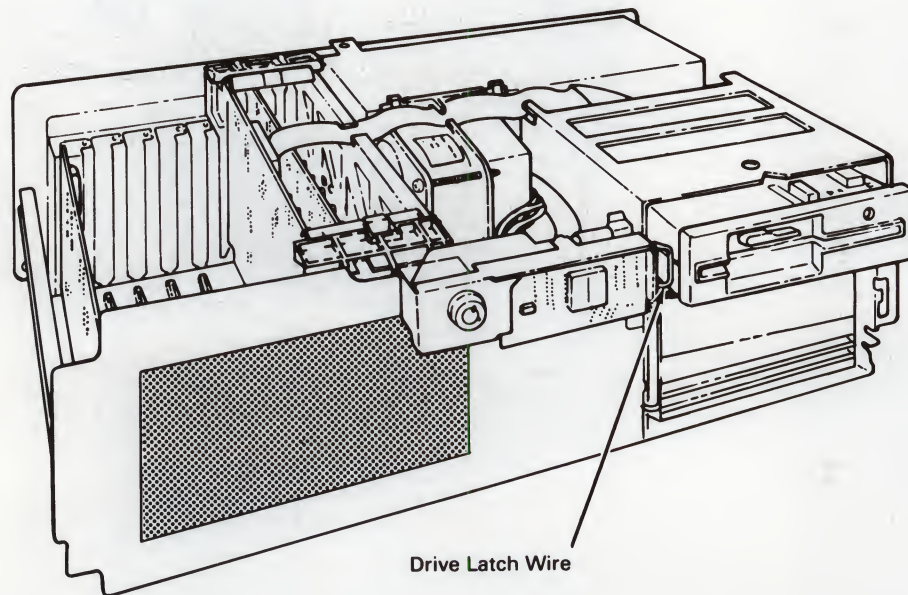


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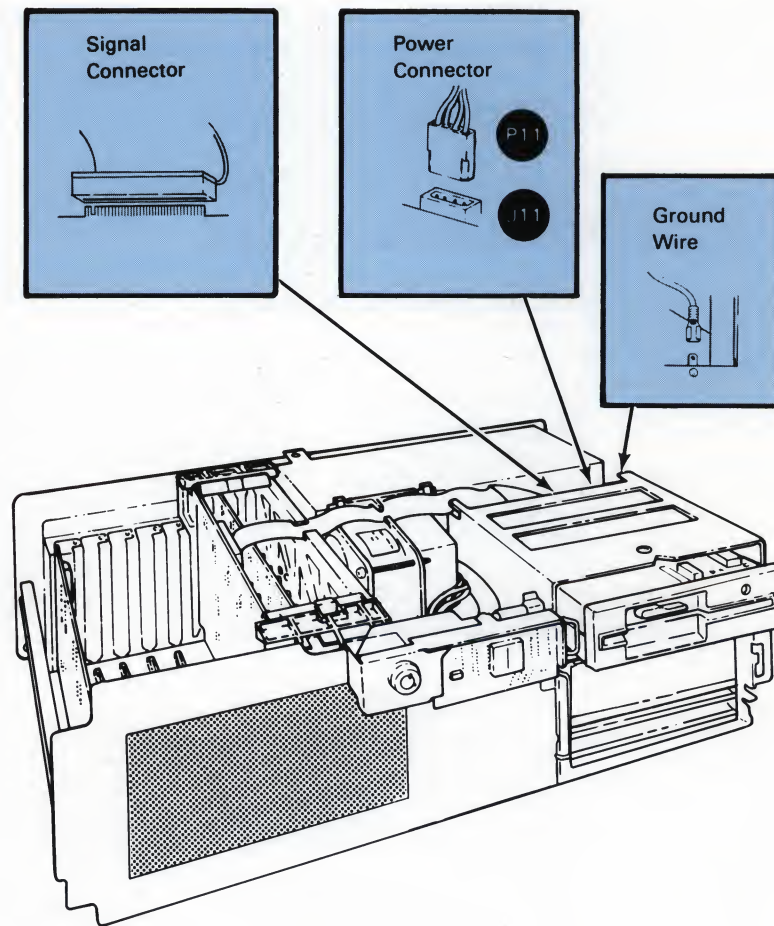
## Diskette Drive Replacement

Follow the Handling a Diskette Drive procedures. If needed, see Section 7.

1. Be sure the terminator resistor is installed. If needed, refer to Section 7.
  2. Align the drive and push it into the system unit until the latch wire clicks.
- 



- 
3. Connect the signal connector
  4. Connect the power connector
  5. Connect the ground wire.
  6. Do the "Top Cover Replacement" on page 4-13.
- 

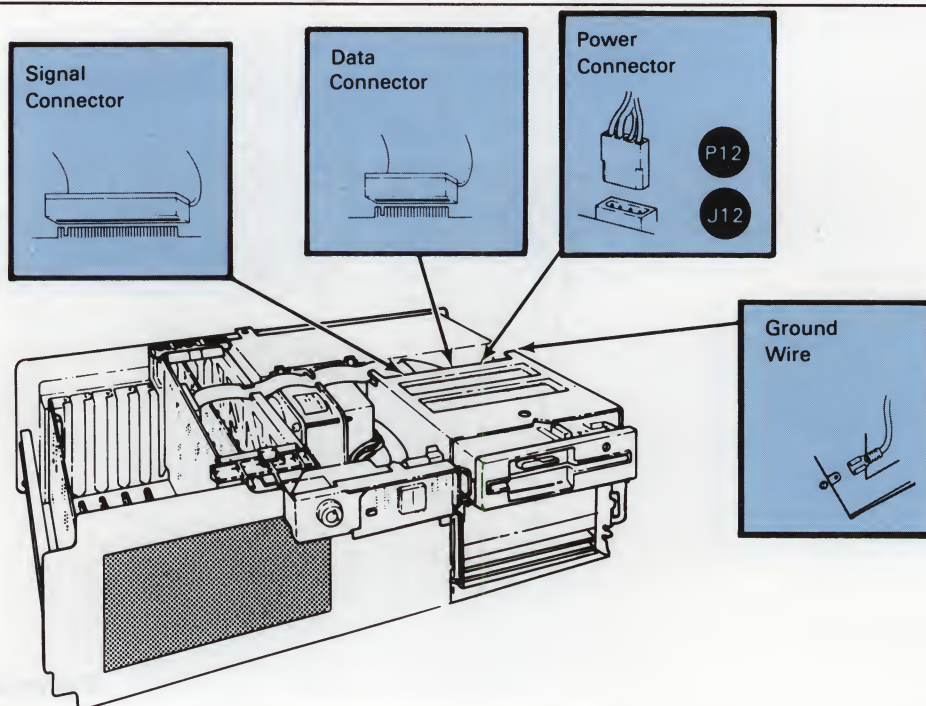




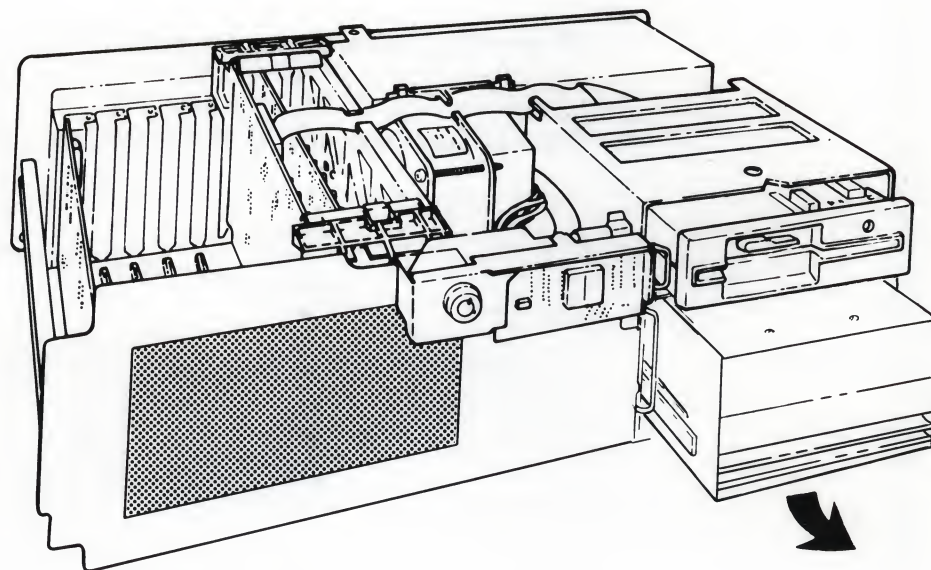
## Fixed-Disk Drive Removal

Follow the Handling a Fixed-Disk Drive procedures. If needed, see Section 8.

1. Do the "Top Cover Removal" on page 4-12.
2. Pull on the latch wire to release the diskette drive, then slide the drive part way out of the system unit.
3. Pull on the latch wire to release the fixed-disk drive, then slide the drive part way out of the system unit.
4. Disconnect the ground wire.
5. Disconnect the power cable.
6. Disconnect the signal cable.
7. Disconnect the data cable.



- 
8. Slide the drive out of the system unit.
- 

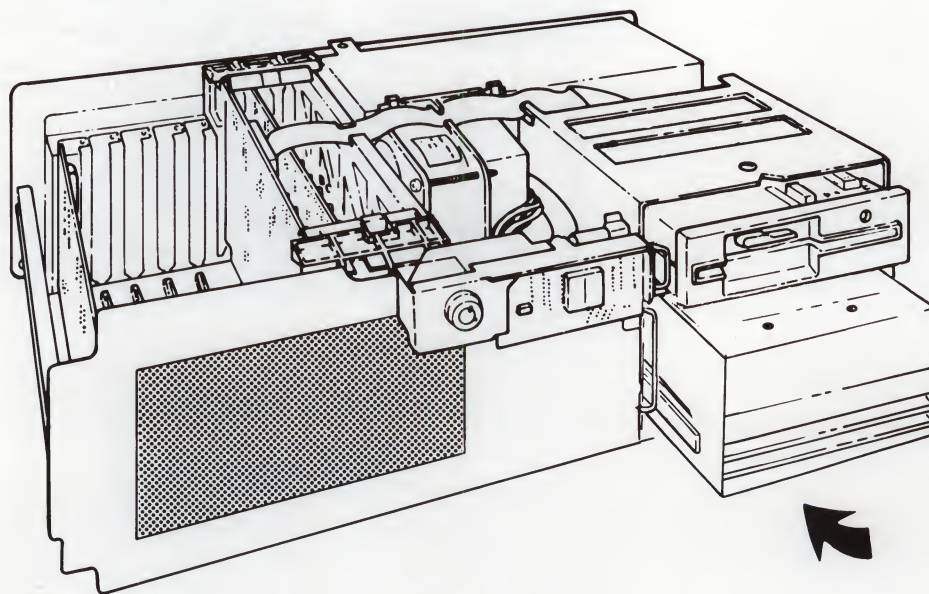


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## Fixed-Disk Drive Replacement

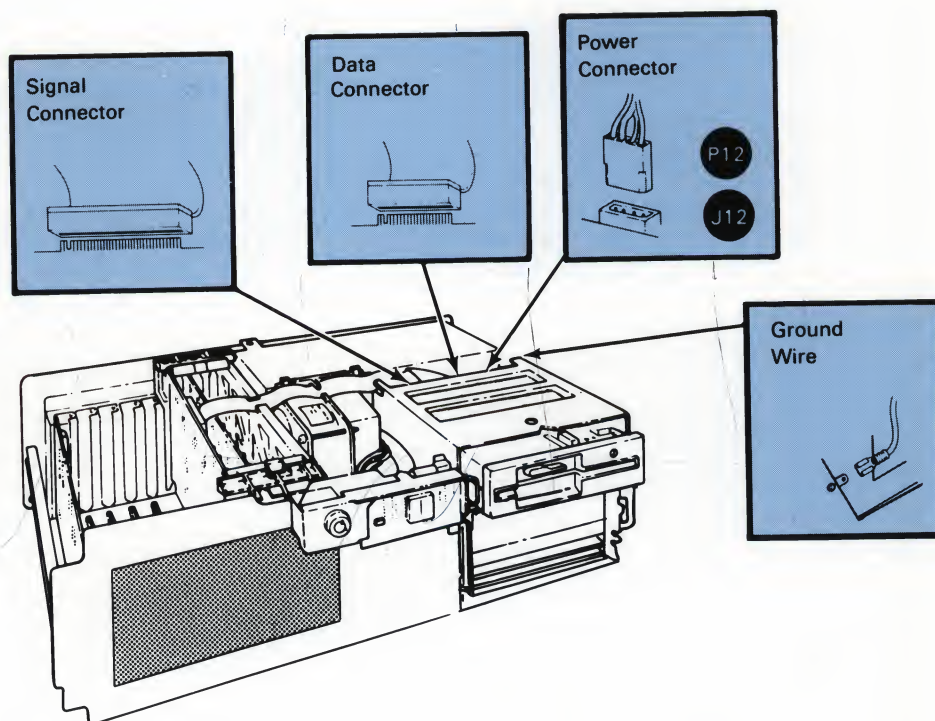
Follow the Handling a Fixed-Disk Drive procedures. If needed, see Section 8.

1. Be sure the terminator resistor and the drive selection jumper are properly installed. If needed, refer to Section 8.
  2. Slide the fixed-disk drive part way into the system unit.
- 





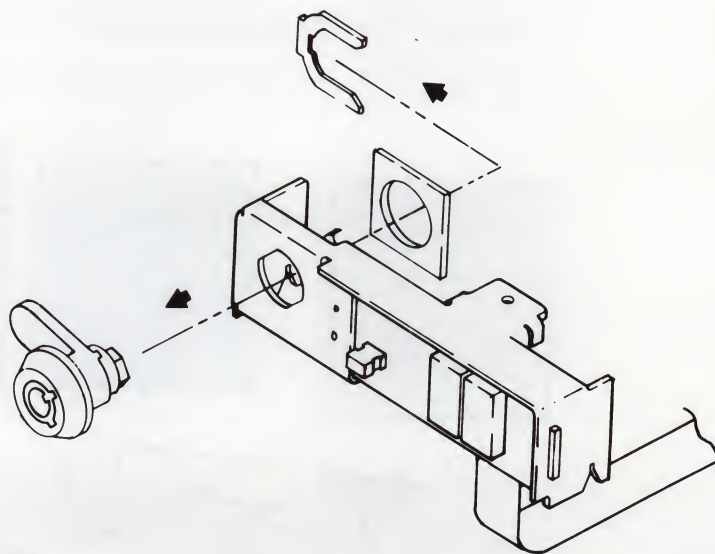
- 
3. Connect the signal cable.
  4. Connect the data cable.
  5. Connect the power cable.
  6. Connect the ground wire.
  7. Slide the fixed-disk drive into the system unit until the latch wire clicks.
  8. Slide the diskette drive into the system unit until the latch wire clicks.
  9. Do the "Top Cover Replacement" on page 4-13.
- 



---

## Keylock Removal

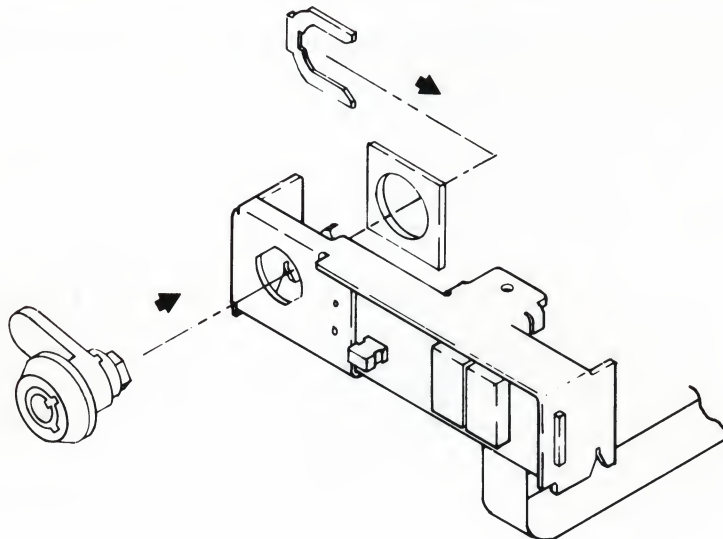
1. Do the "Operator Panel Board Removal" on page 4-36.
  2. Be sure the keylock is in the Unlocked position.
  3. Remove the mounting clip.
  4. Remove the keylock and spacer.
- 



---

## Keylock Replacement

1. Be sure the keylock is in the Unlocked position.
  2. Install the keylock and spacer, then install the mounting clip.
  3. Do the "Operator Panel Board Replacement" on page 4-37.
- 

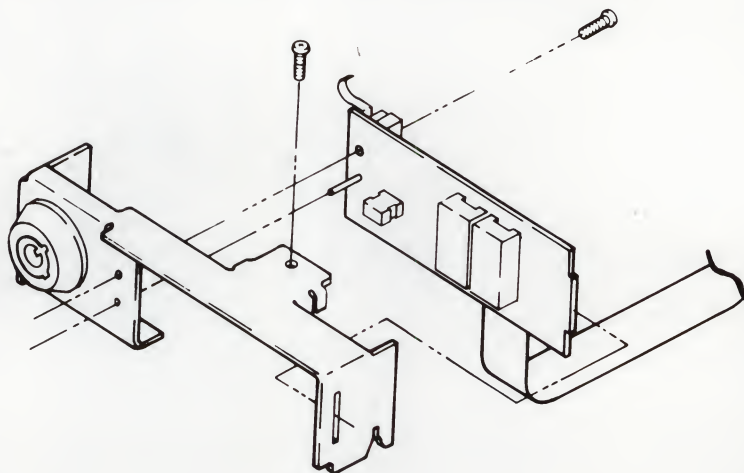




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## Operator Panel Board Removal

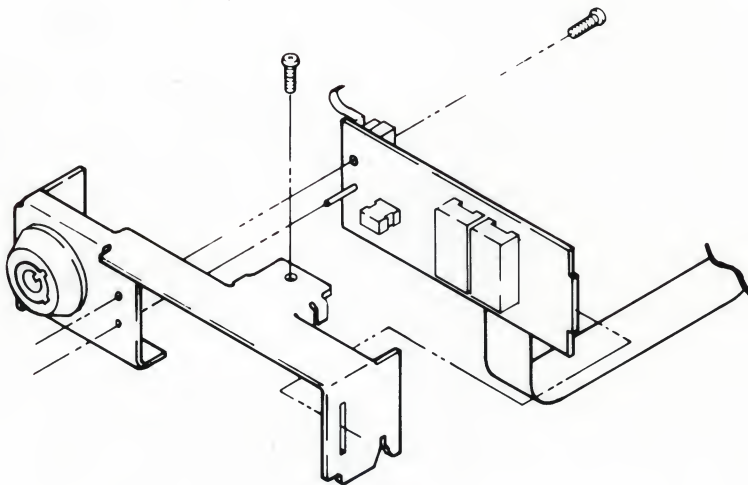
1. Do the "Top Cover Removal" on page 4-12.
  2. Be sure the keylock is in the Unlocked position.
  3. Disconnect the operator panel cable from the system board.
  4. Remove the mounting screw and the operator panel assembly.
  5. Remove the mounting screw and the operator panel board.
- 



---

## Operator Panel Board Replacement

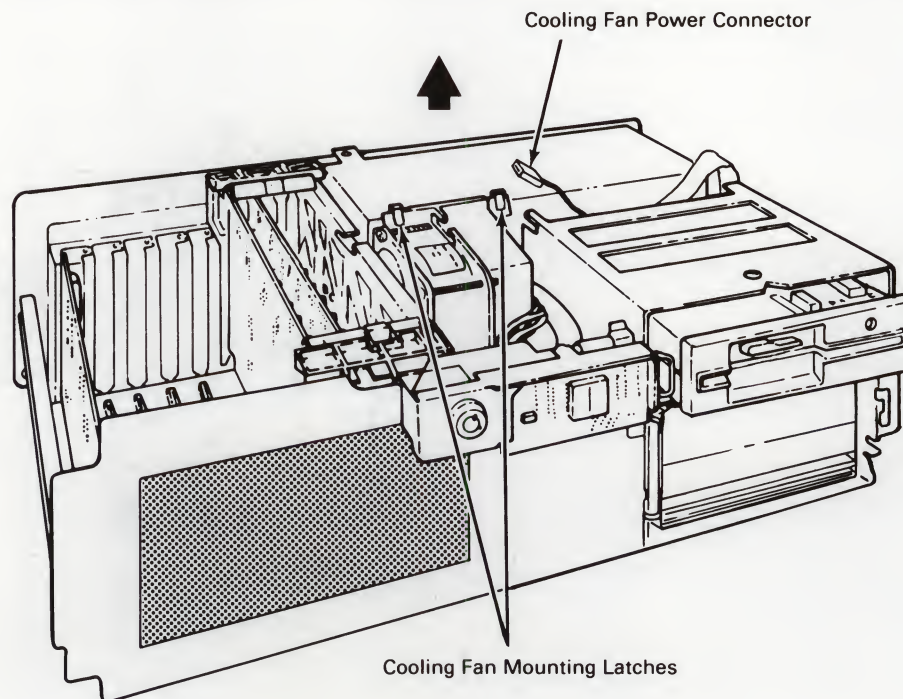
1. Be sure the keylock is in the Unlocked position.
  2. Install the operator panel board and mounting screw.
  3. Install the operator panel assembly and mounting screw.
  4. Connect the operator panel cable to the system board.
  5. Do the "Top Cover Replacement" on page 4-13.
- 



---

## Cooling Fan Assembly Removal

1. Do the "Top Cover Removal" on page 4-12.
  2. Remove the fixed-disk and diskette adapter from slot 6 and place it on top of the system unit with the cables attached.
  3. Disconnect the cooling fan power cable.
  4. Pull the fan mounting latches toward the front, then lift up on the cooling fan assembly.
- 

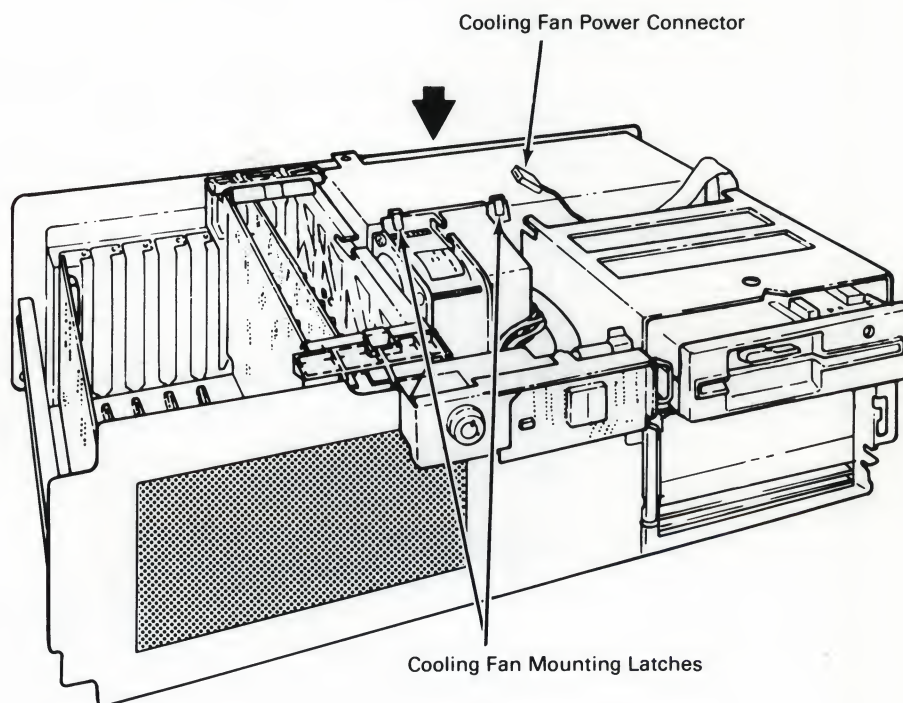




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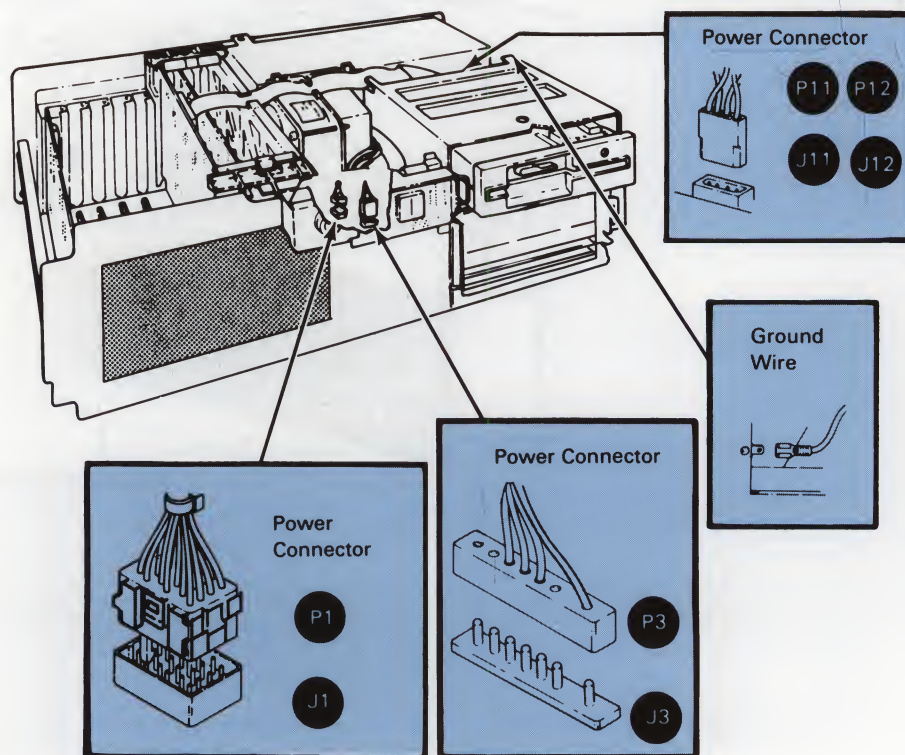
## Cooling Fan Assembly Replacement

1. Align the cooling fan assembly and press into position.
  2. Connect the cooling fan assembly power cable.
  3. Install the fixed-disk and diskette adapter in slot 6.
  4. Do the "Top Cover Replacement" on page 4-13.
- 

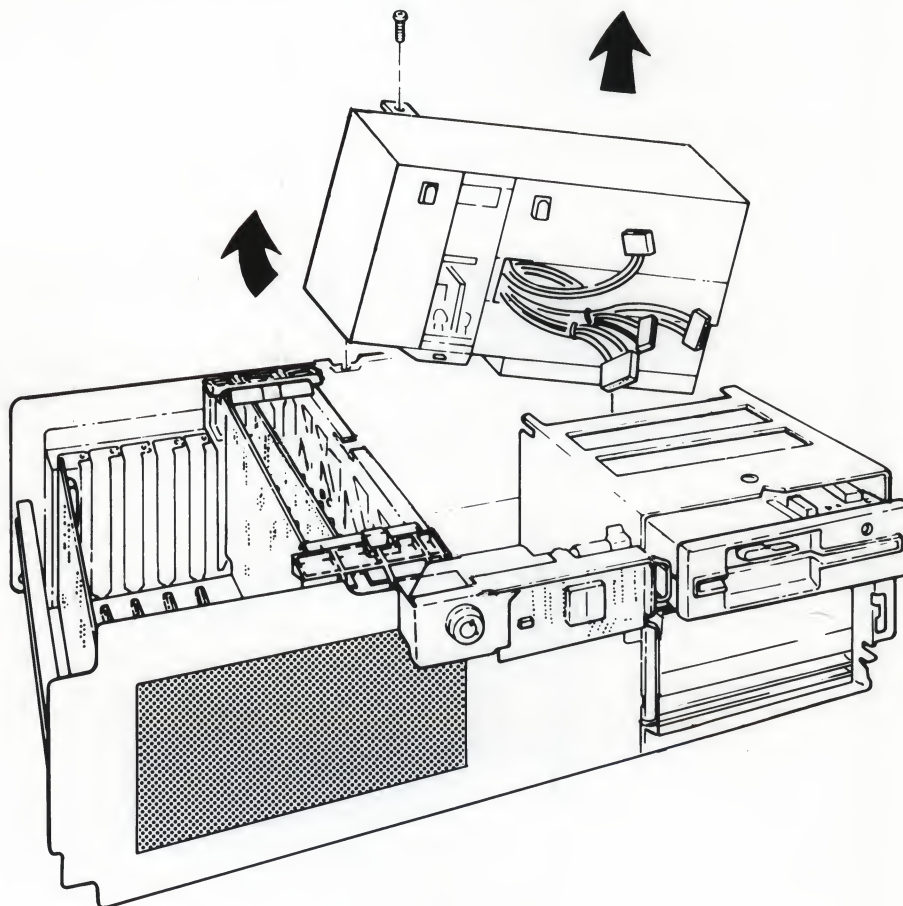


## Power Supply Removal

1. Do the "Top Cover Removal" on page 4-12.
2. Disconnect the external power cable at the power supply.
3. If present, disconnect the display power cable at the power supply.
4. Remove the cooling fan assembly (page 4-38).
5. Disconnect the power cables from the system board (2), fixed-disk, and diskette drive. If needed, slide the fixed-disk and diskette drives part way out.
6. Disconnect the signal cables and ground wire from the fixed-disk and diskette drives.



- 
7. Remove the power supply mounting screw.
  8. Raise the end of the power supply next to the mounting screw, then lift the power supply up out of the system unit.
- 

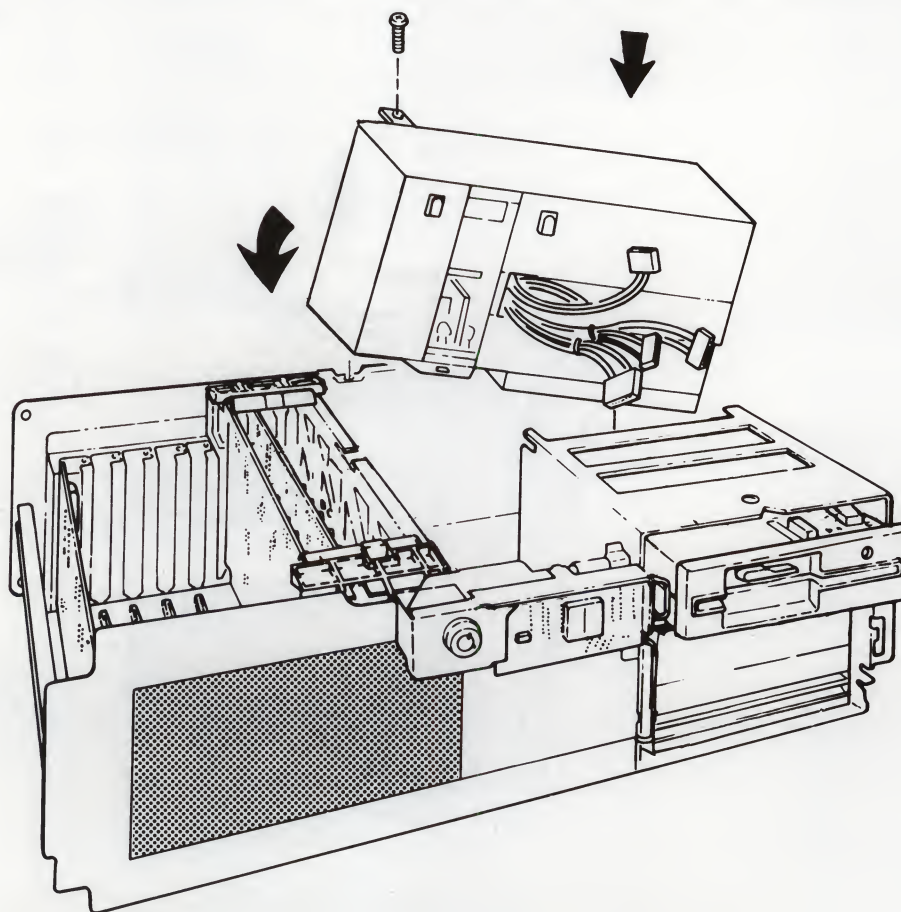




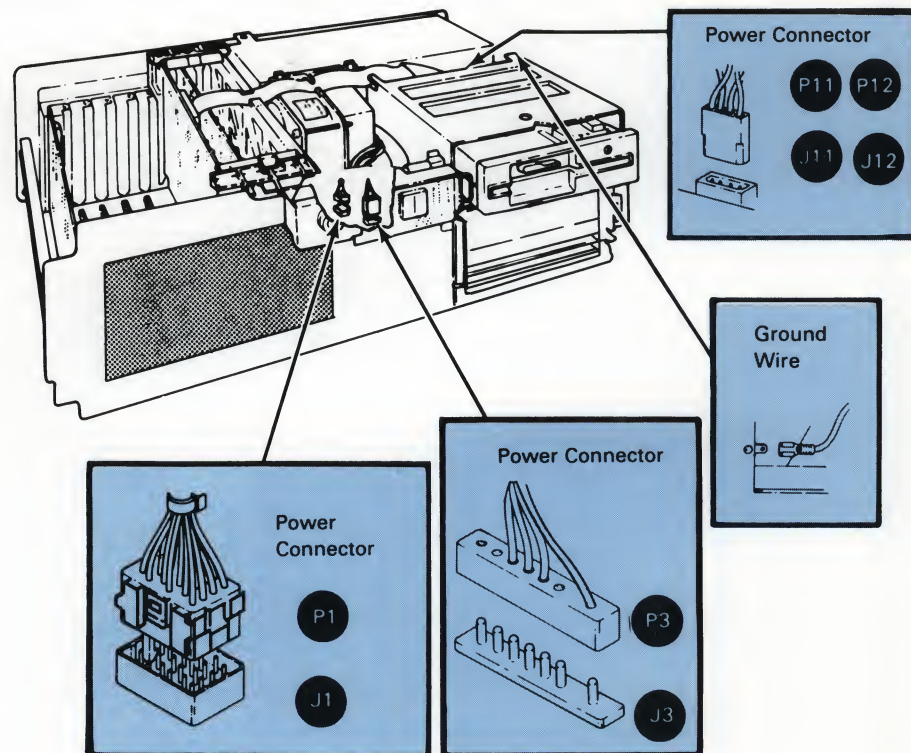
---

## Power Supply Replacement

1. Lower the power switch end of the power supply into the system unit until the step contacts the base, then lower the other end into position.
  2. Install the power supply mounting screw.
- 



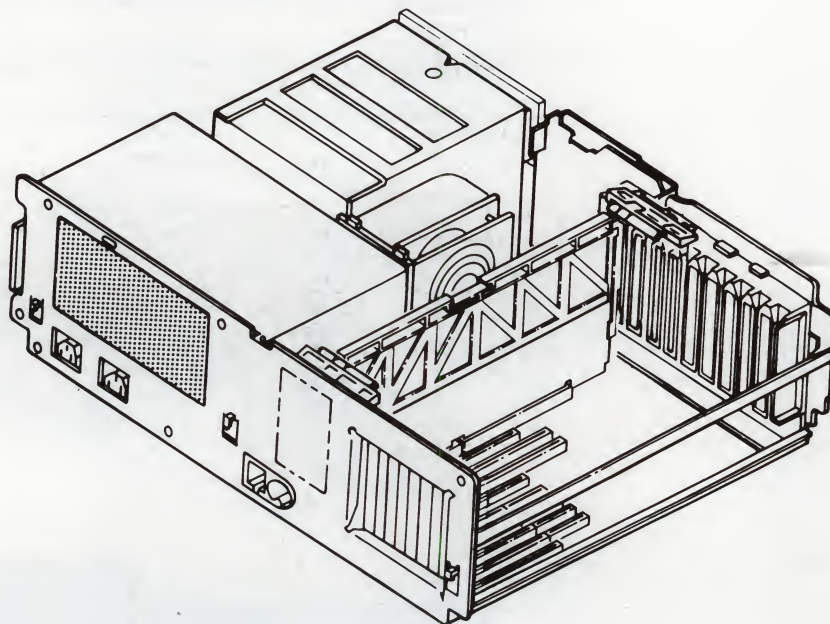
3. Connect the power cables to the system board (2), fixed-disk, and diskette drive.
4. Connect the signal cables and ground wire to the fixed-disk and diskette drives.
5. Install the cooling fan assembly (page 4-39).
6. If present, connect the display power cable to the power supply.
7. Connect the external power cable to the power supply.
8. Do the "Top Cover Replacement" on page 4-13.



---

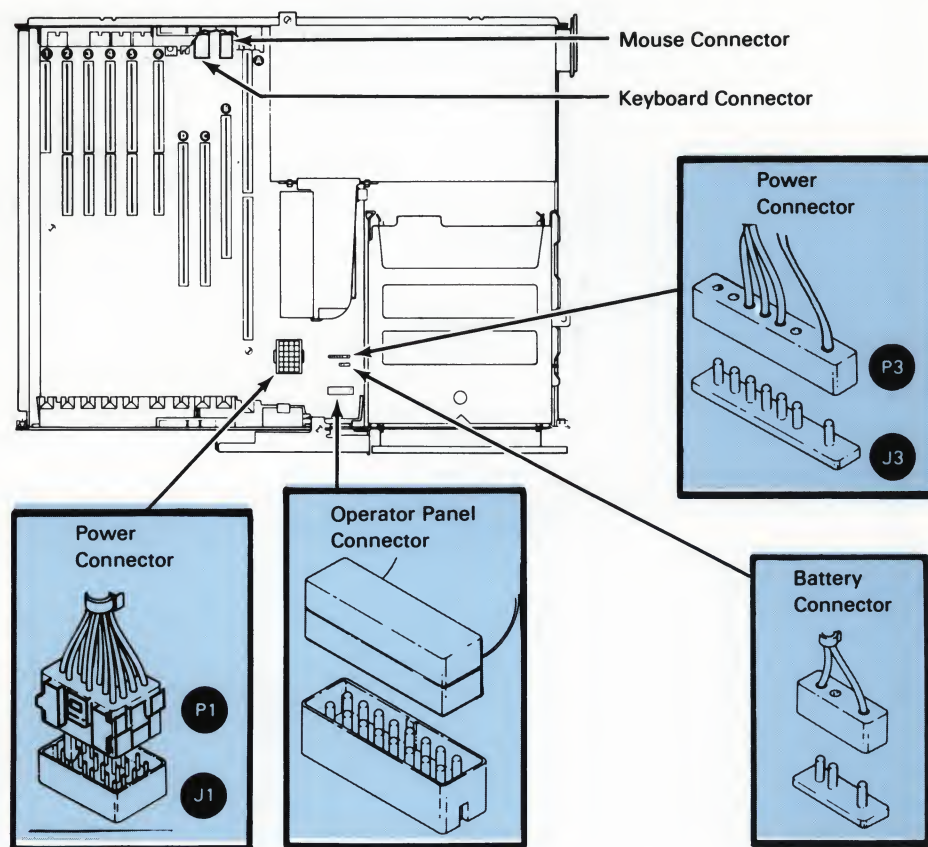
## System Board Removal

1. Do the "Top Cover Removal" on page 4-12.
  2. Remove the external power cable at the power supply.
  3. Remove all of the external cables attached to the system board or the adapters.
- 

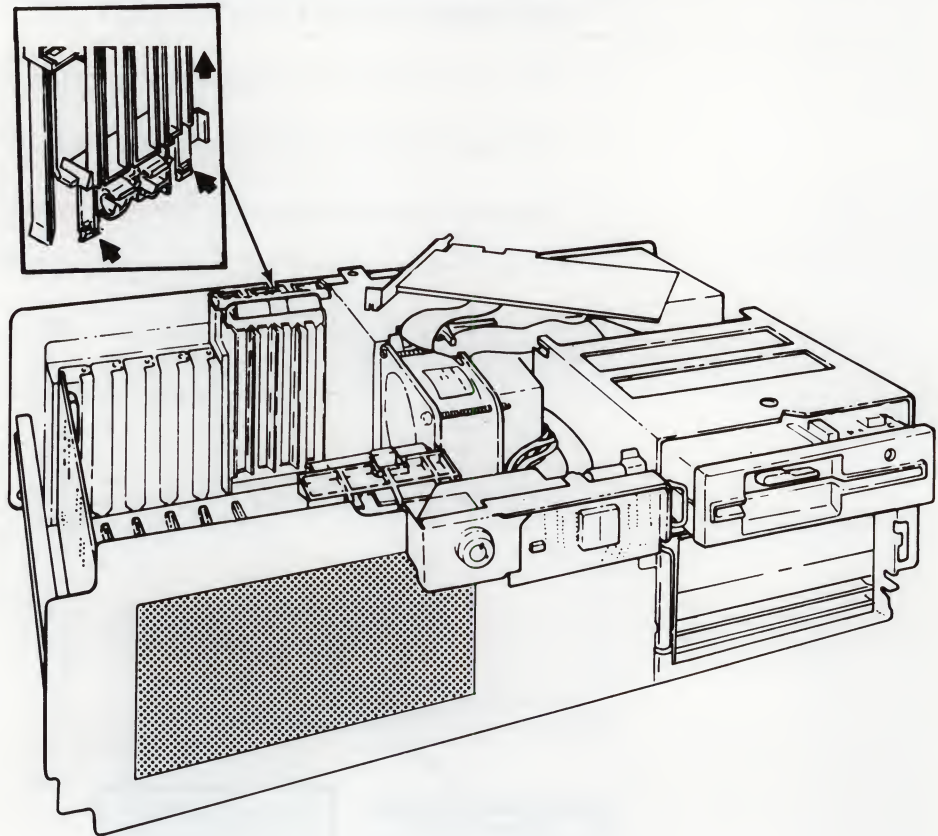




4. Remove the fixed disk and diskette drive adapter from slot 6 and place it on top of the system unit with the cables attached.
5. Remove all of the remaining adapters and boards. Record the type and slot position of each (pages 4-18 or 4-14).
6. Disconnect the power connectors from the system board.
7. Disconnect the operator panel cable from the system board.
8. Disconnect the battery cable from the system board.



- 
9. Press back on the two rear guide latches and lift the guide up out of the system unit.
- 

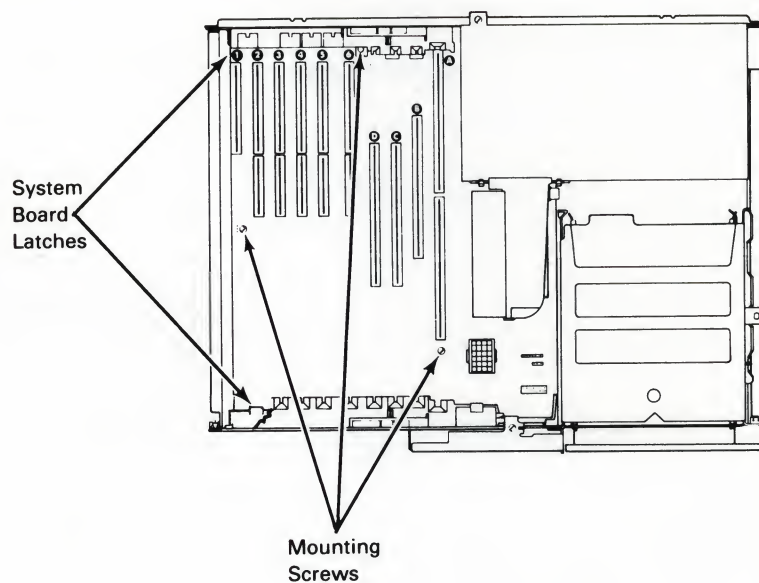


---

10. Remove the three system board mounting screws.

11. Press on the latches, then remove the system board by lifting it up and sliding it out the end of the system unit.

---

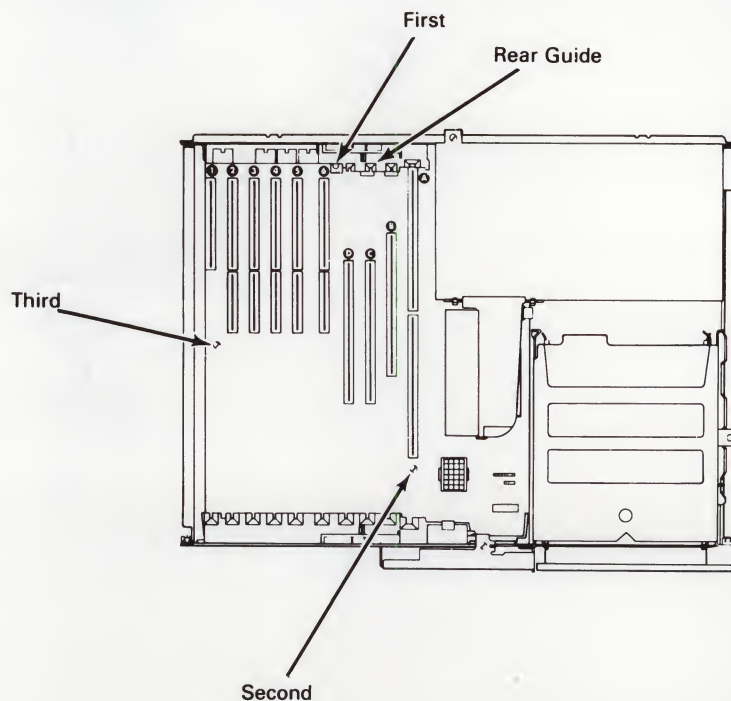




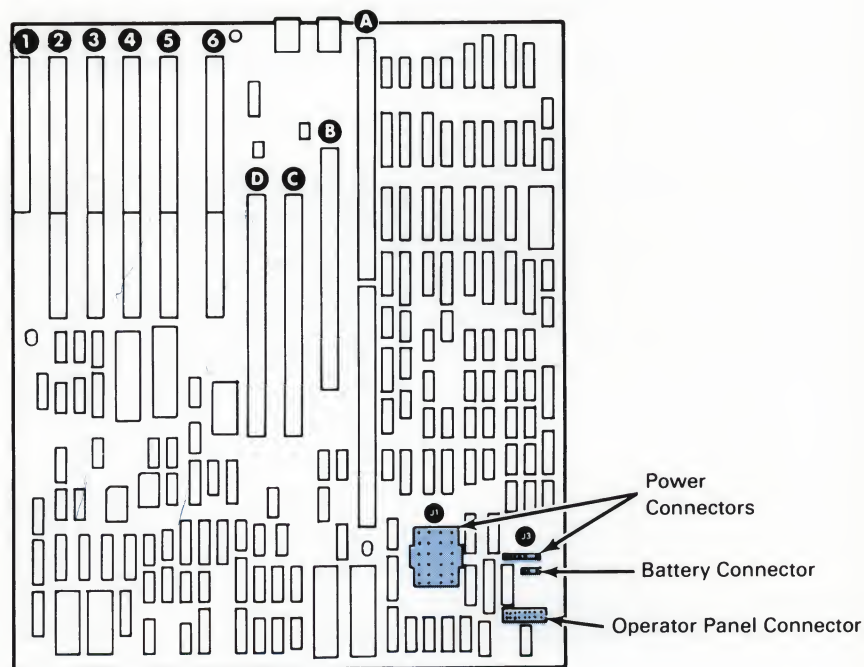
---

## System Board Replacement

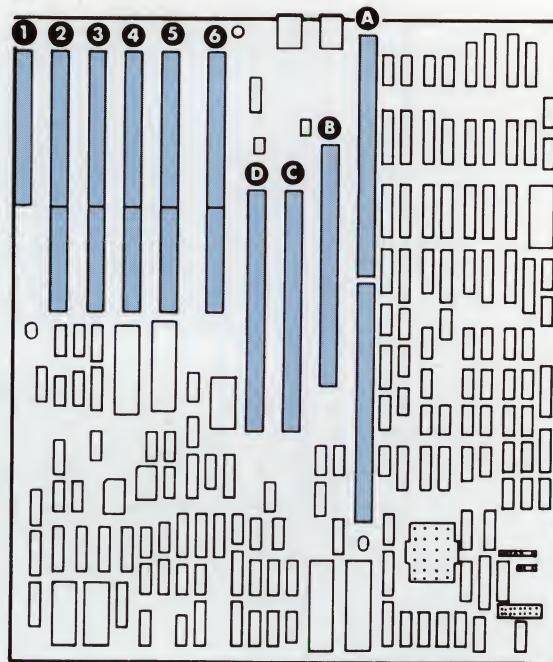
1. Slide the system board in the end of the system unit and press down into position.
  2. Install the three system board mounting screws in the sequence indicated below.
  3. Align the rear guide and press it down into position.
- 



- 
4. Connect the operator panel cable to the system board.
  5. Connect the battery cable to the system board.
  6. Connect the power cable connectors to the system board.
- 



- 
7. Look at the types and positions you recorded, then install each adapter and board.
  8. Install the fixed-disk and diskette adapter in slot 6.
  9. Connect each of the external cables to the system board and adapters.
  10. Connect the external power cable to the power supply.
  11. Do the "Top Cover Replacement" on page 4-13.
- 





## **Section 5. Base System Unit**

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## About this Section

This section contains the description, specifications, locations, and parts list for the base system unit components.

The floating-point board is an optional feature. It is included in this section because it improves the numerical processing ability of the 32-bit processor during floating point operations.

The floating-point board is an optional feature and may not be present on your system.

Some pages in this section contain a 3-digit product code in the page number to make future updating easier.



## Base System Unit

The Base System Unit of the IBM 6151 System Unit consists of the system board, processor board, floating-point board, power supply, operator panel, covers, and hardware.

## Specifications

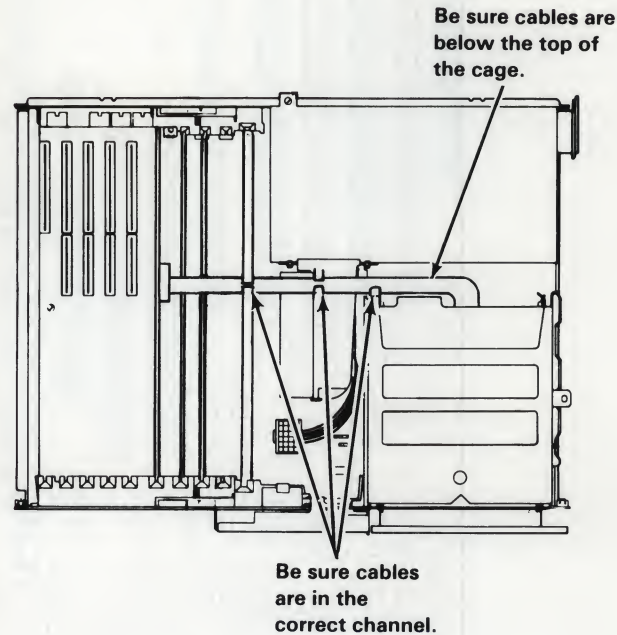
Height	160 mm (6 1/4 inches)
Width	540 mm (21 1/4 inches)
Depth	465 mm (18 1/4 inches)
Weight	25 kg (60 pounds)
Temperature	15.6 to 32.2°C (60 to 90°F)
Humidity	8 - 80 percent, noncondensing
Input voltages	U.S., 90 - 137 V ac WT low, 90 - 137 V ac WT high, 180 - 259 V ac
Power (includes attached display)	U.S., 0.8 kVA WT low voltage, 0.8 kVA WT high voltage, 0.9 kVA
Hertz	48 to 62
Heat output	620 W (2150 BTU/hr)
Altitude	0 to 2135 m (0 to 7000 feet)

## Removal and Replacement Procedures

See Section 4 for your type unit or device.

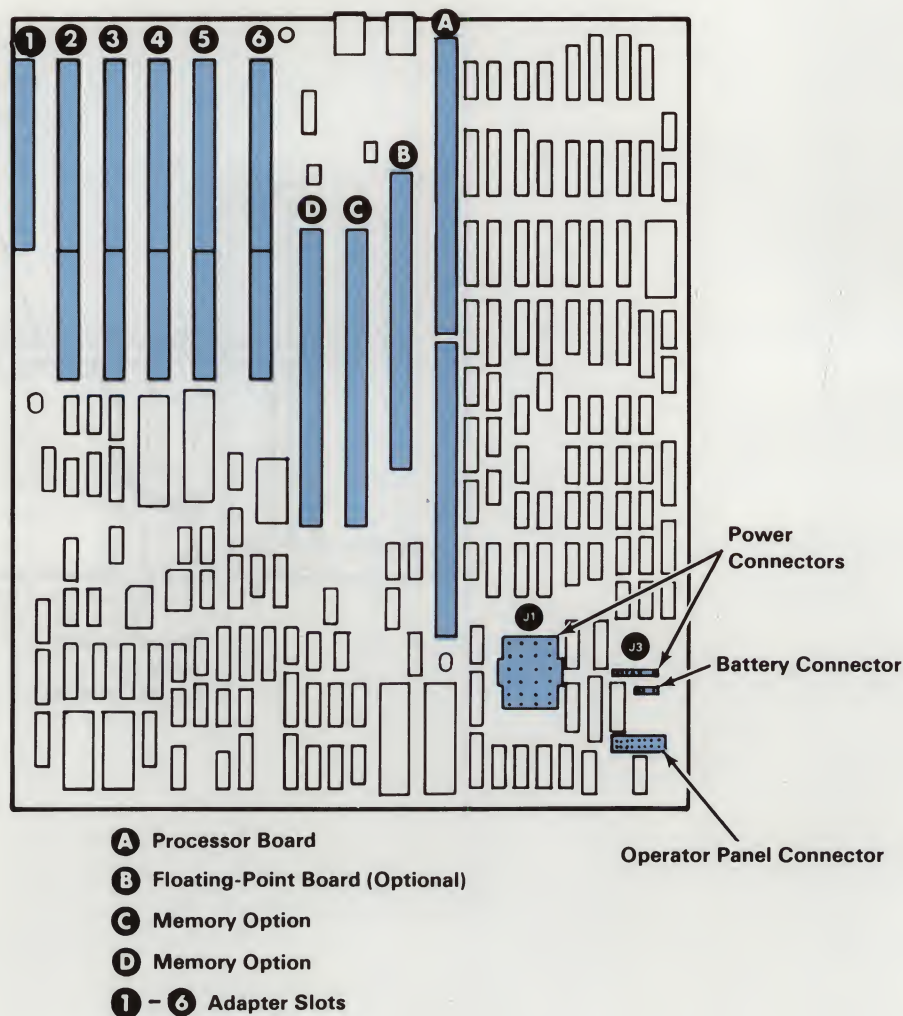
## Internal Signal Cable Routing Diagram

Use this Internal Signal Cable Routing Diagram to correctly route the internal cables. Route the signal cables as shown to prevent interference with top cover.



## System Board

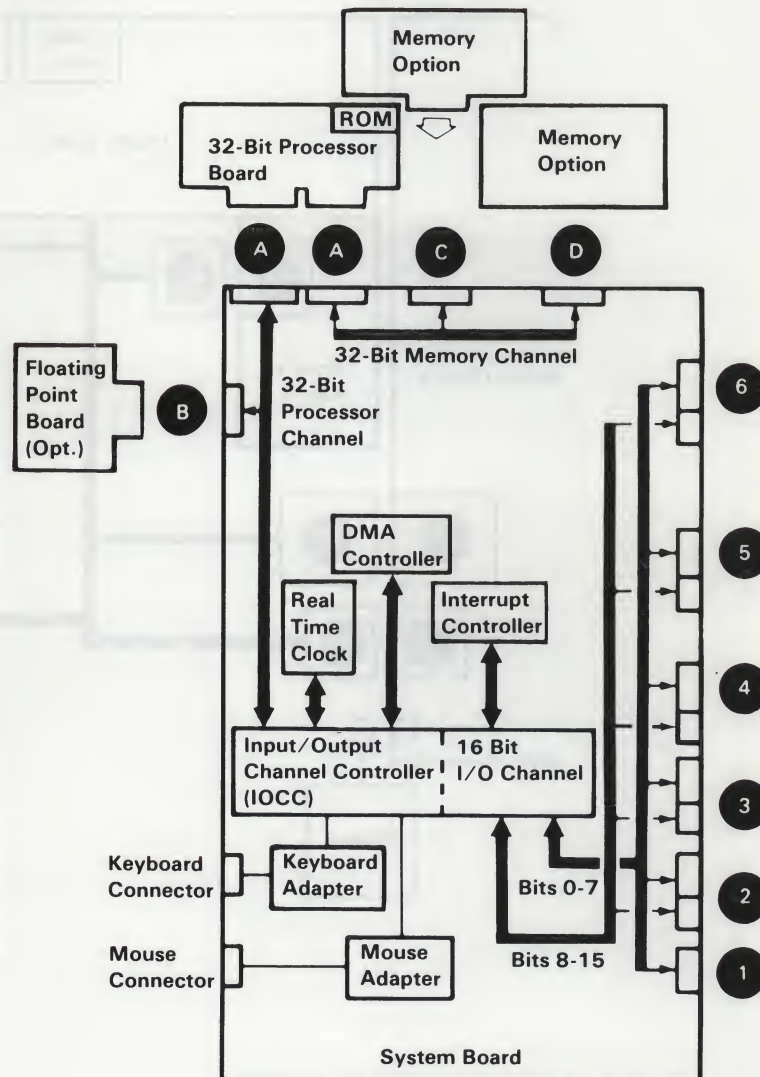
The System Board contains the keyboard adapter, mouse adapter, and slots for the processor board, floating-point board, system memory boards, and I/O adapters.





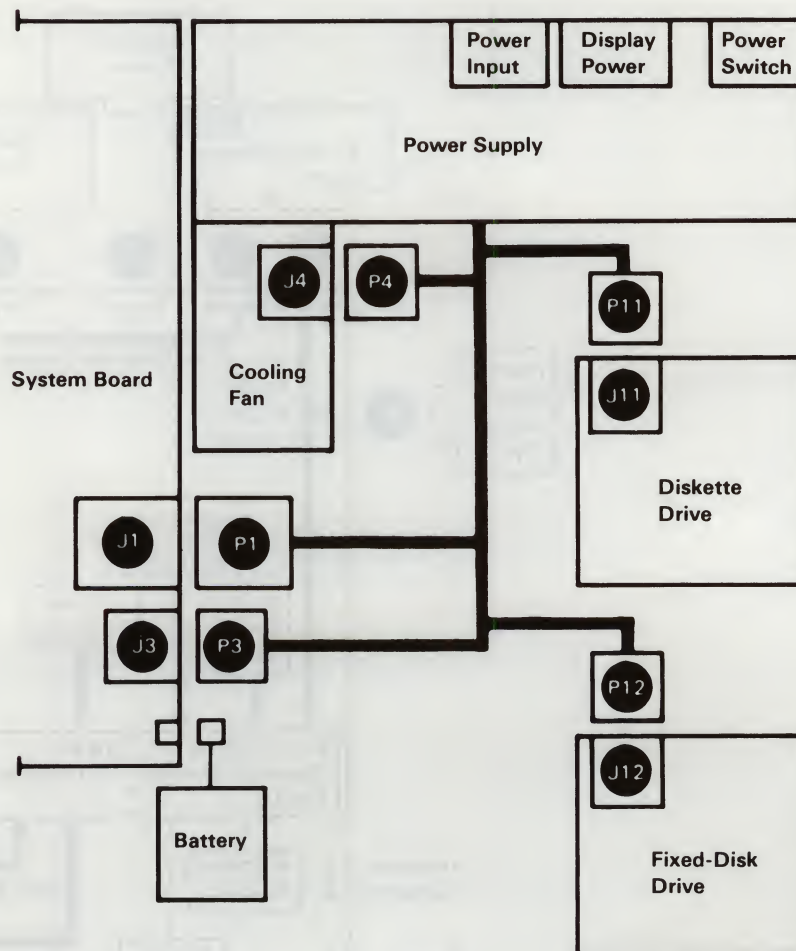
## Data Flow Diagram

Use the Data Flow Diagram to identify data flow paths between the system devices.



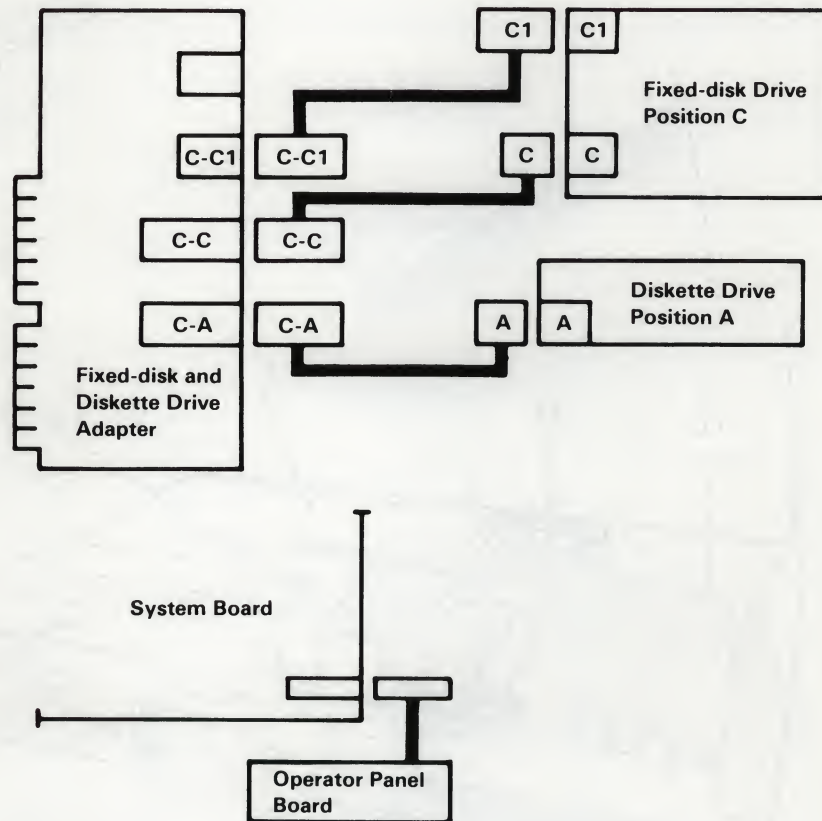
## Power Distribution Diagram

Use the Power Distribution Diagram to identify the power connectors.



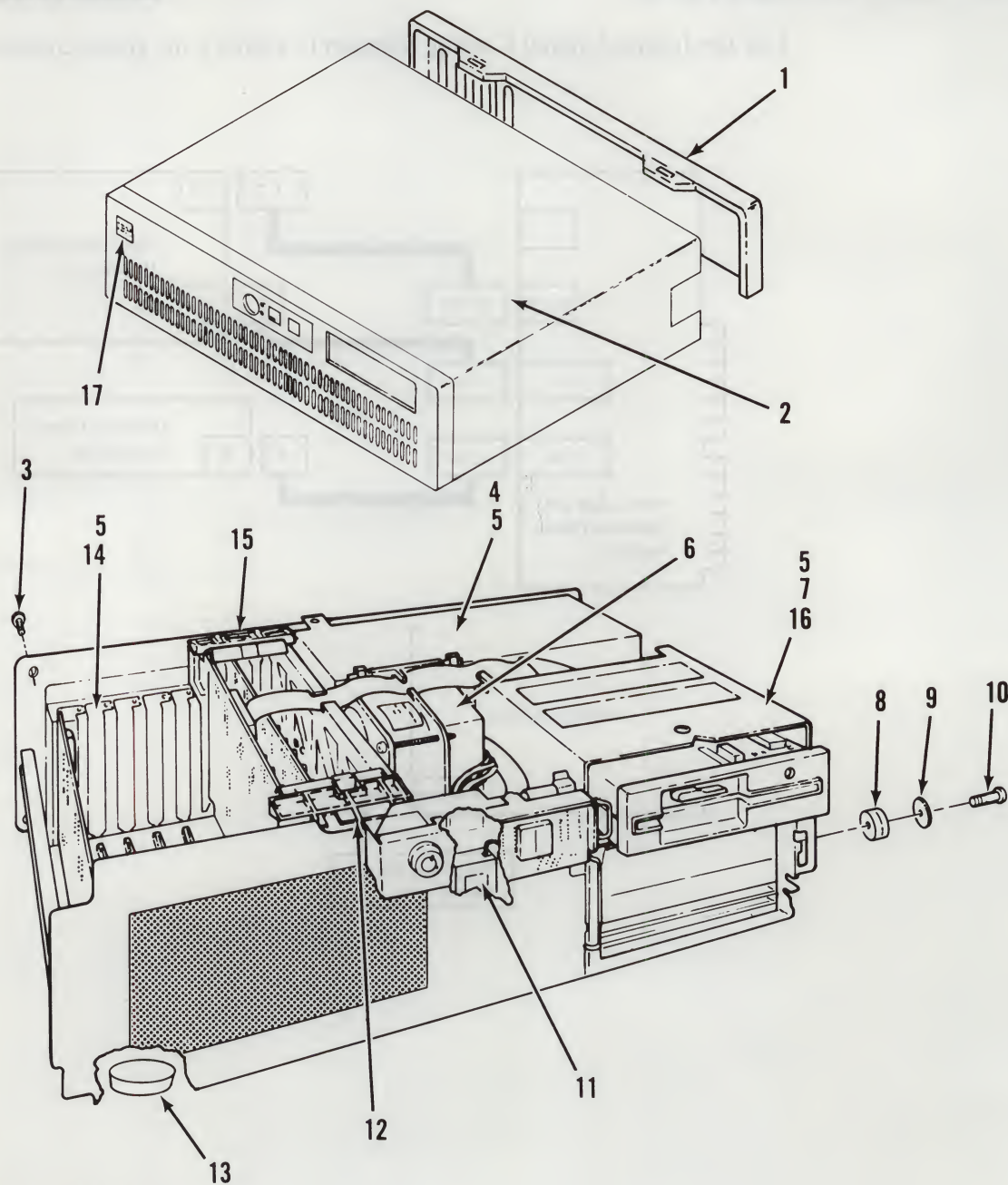
## Internal Signal Cabling Diagram

Use the Internal Signal Cabling diagram to identify the signal connectors.

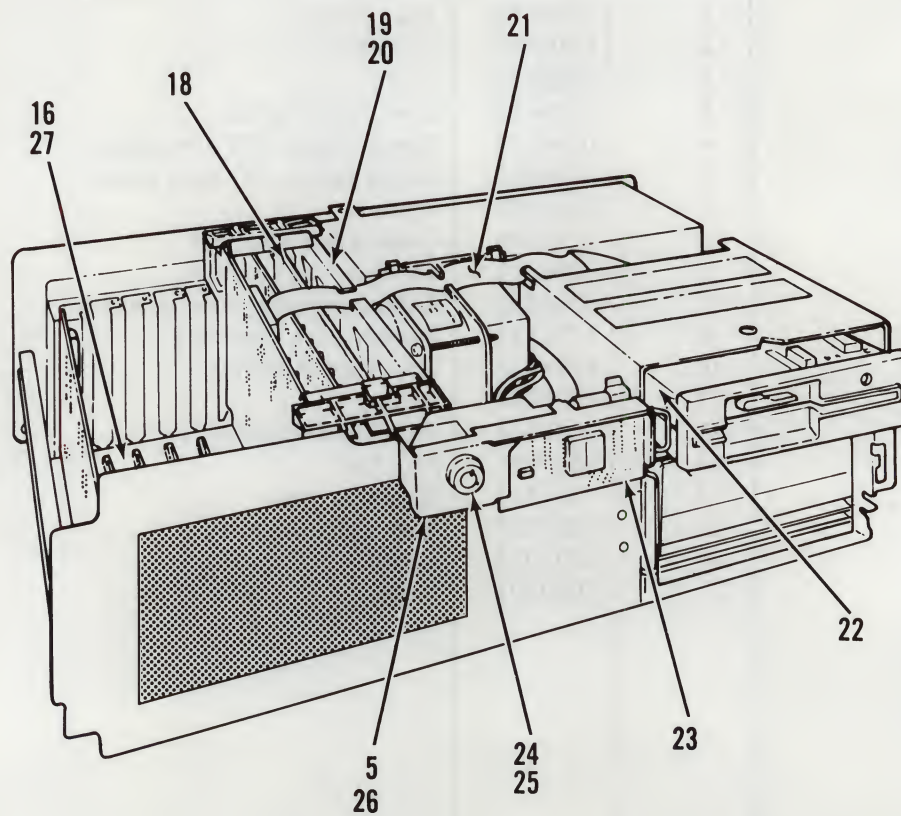




## Parts Information



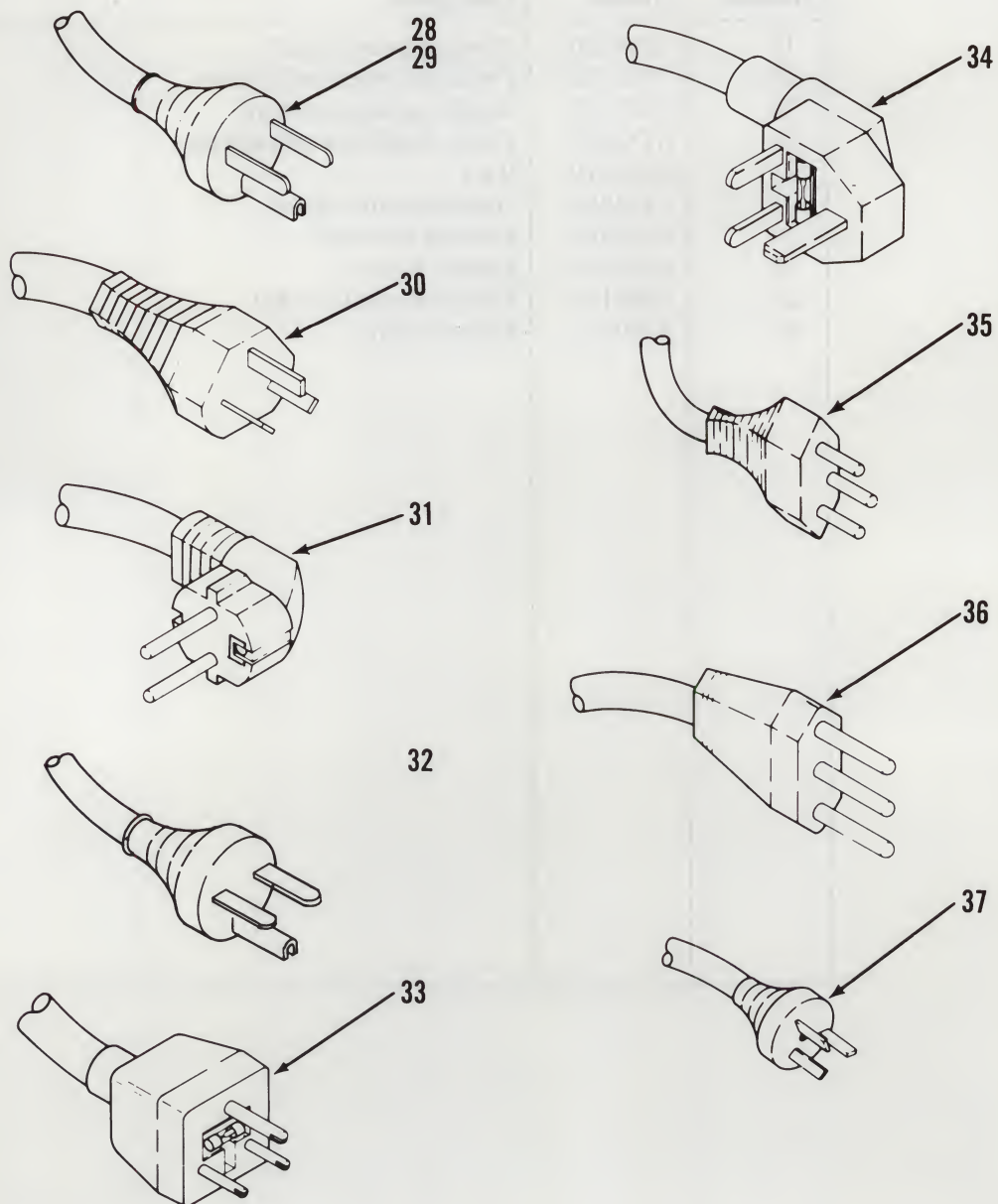
Index Number	Part Number	Description
1	6298356	Rear cover
2	6298378	Top cover
3	6080460	Screw
4	6298452	Power supply, U.S.
4	6298454	Power supply, WT low voltage
4	6298453	Power supply, WT high voltage
5	6080443	Screw
6	6298355	Cooling fan assembly
7	6298997	Shock mount retainer
8	6294696	Rubber bushing, rack mounting
9	6294819	Washer, rack mounting
10	6298395	Stud, rack mounting
11	6299201	Battery
12	6080458	Front guide assembly
13	6360965	Pad, foot
14	1501437	Blank bracket
15	6080459	Rear guide assembly
16	6299014	Screw
17	6080401	Logo





---

Index Number	Part Number	Description
18	6299220	Floating-point board
19	79X3766	Processor board with holder
20	6298223	Holder, processor board
21	61X6800	Cable, fixed-disk and diskette
22	6298410	Rack
23	6453886	Operator panel board
24	6299485	Keylock assembly
25	6299523	Spacer, keylock
26	6298181	Operator panel bracket
27	6299231	System board



Index Number	Part Number	Description
28	6952300	Power cable, U.S., Venezuela, Canada, Japan, Saudi Arabia
29	6952301	Power cable, Cook County, Illinois
30	6952311	Power cable, Australia, New Zealand, Argentina
31	6952320	Power cable, Northern Europe, Greece, Turkey
32	1838574	Power cable, Thailand
33	6952347	Power cable, South Africa
34	6952356	Power cable, U.K., Ireland, Hong Kong, Singapore
35	6952365	Power cable, Switzerland
36	6952374	Power cable, Italy, Chile
37	6952383	Power cable, Israel





## **RT PC Processor Board**

The RT PC Processor Board contains the 32-bit processor, the system memory controller, and the ROM modules. Each processor board contains an identification number.

### **Processor Board Identification Number**

Each processor board contains an identification number used by the software to control access. This identification number is unique to that processor board.

After the processor board is exchanged, the identification number is a different number. Therefore, any program that uses the identification number for access needs the authorization updated.

**Reminder to Service Representative:** After you exchange the Processor Board, notify the customer that the unique identification number of the system unit has changed. The customer needs to update the authorization for any program that uses the identification number for access.

### **Removal Procedure**

See Processor, Floating-Point, or System Memory Removal in Section 4.

### **Replacement Procedure**

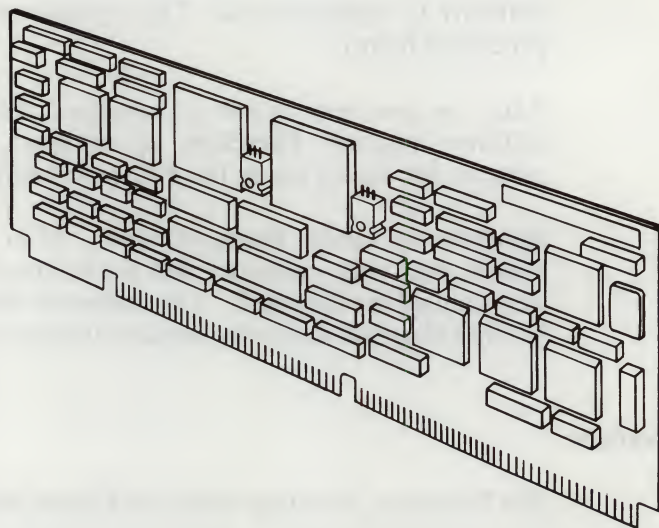
See Processor, Floating-Point, or System Memory Replacement in Section 4.

## Parts Information

For part numbers see Parts Information for the Base System Unit in this section.

Use the drawing below to identify the processor board.

---





## **RT PC Advanced Processor Board**

The RT PC Advanced Processor Board contains the 32-bit processor, a floating-point unit, the system memory controller, and the ROM modules.

### **Processor Board Identification Number**

Each processor board contains an identification number used by the software to control access. This identification number is unique to that processor board.

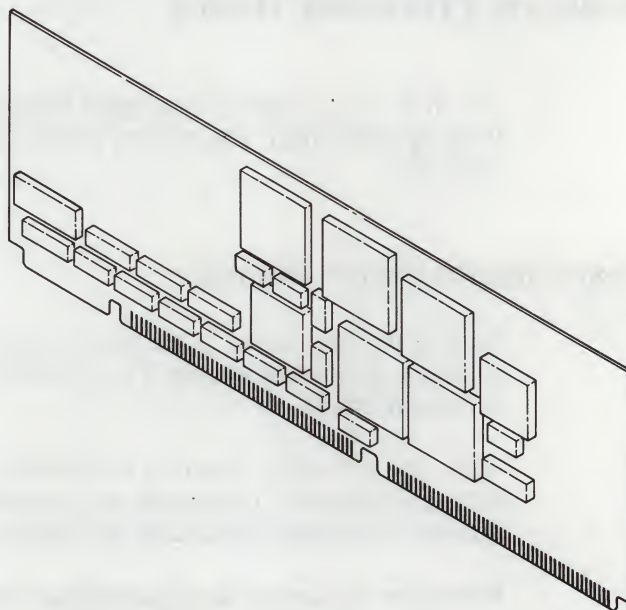
After the processor board is exchanged, the identification number is a different number. Therefore, any program that uses the identification number for access needs the authorization updated.

**Reminder to Service Representative:** After you exchange the Processor Board, notify the customer that the unique identification number of the system unit has changed. The customer needs to update the authorization for any program that uses the identification number for access.

### **Removal and Replacement Procedures**

Use the Processor, Floating-Point, or System Memory Removal and Replacement procedures in Section 4.

## Parts Information



Index Number	Part Number	Description
1	08F3639	RT PC Advanced Processor Board

---

## RT PC Floating-Point Board

The RT PC Floating-Point Board improves the numerical processing ability of the 32-bit processor.

### Removal and Replacement Procedures

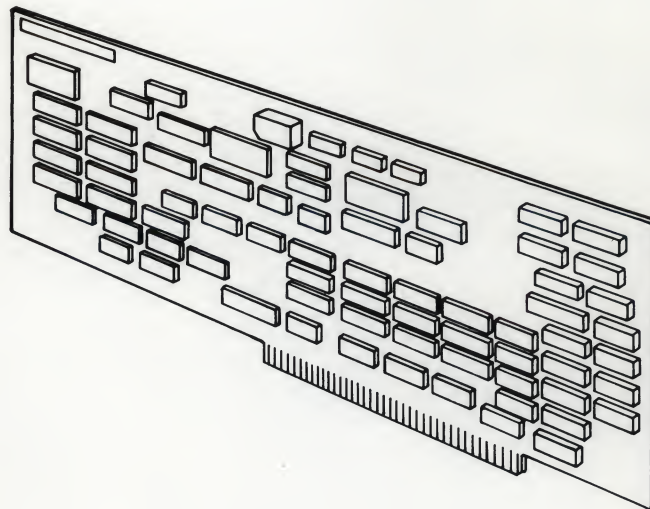
See "Processor, Floating-Point, or System Memory Removal" on page 4-16.

### Parts Information

For part numbers see Parts Information for the Base System Unit in this section.

Use the drawing below to identify the floating-point board.

---







---

## **RT PC Advanced Floating-Point Board**

The RT PC Advanced Floating-Point Board improves the numerical processing ability of the 32-bit processor. The RT PC Advanced Floating-Point Board includes a second smaller board that plugs onto the first board. Both boards are included when ordering the replacement FRU.

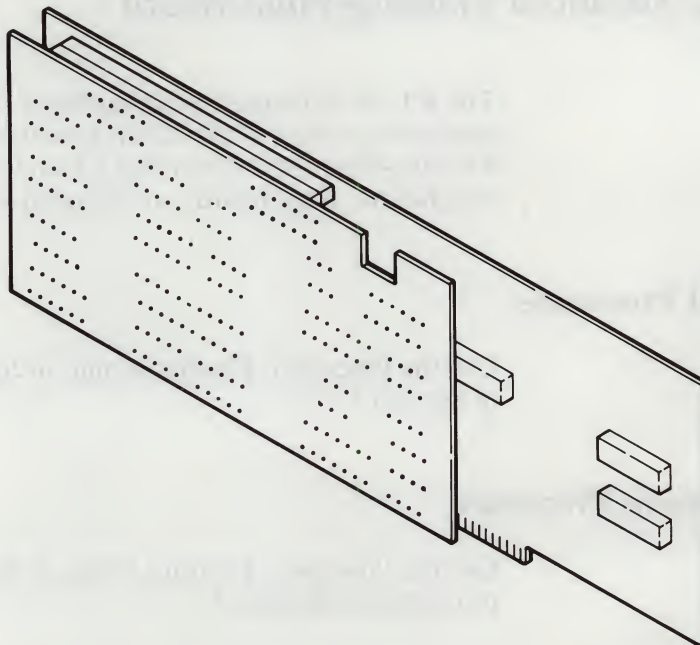
### **Removal Procedure**

Use the Processor, Floating-Point, or System Memory Removal procedure in Section 4.

### **Replacement Procedure**

Use the Processor, Floating-Point, or System Memory Replacement procedure in Section 4.

## Parts Information



Index Number	Part Number	Description
1	61X6814	RT PC Advanced Floating-Point Board



## **Section 6. System Memory Options**

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Removal and Replacement Procedures .....	6-008-1
Parts Information .....	6-008-2
RT PC 2MB Memory Expansion Option .....	6-010-1
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## About this Section

This section contains the service information for the system memory options. These memory boards are directly addressed by the processor board.

See Section 9, "Adapters" for memory options that install in adapter slots 2 through 7 and attach to the I/O channel.

Pages in this section contain a 3-digit product code in the page number to make future updating easier.





---

## RT PC 1MB Memory Expansion Option

The RT PC 1MB Memory Expansion Option provides direct-addressable memory for the 32-bit processor.

### Specifications

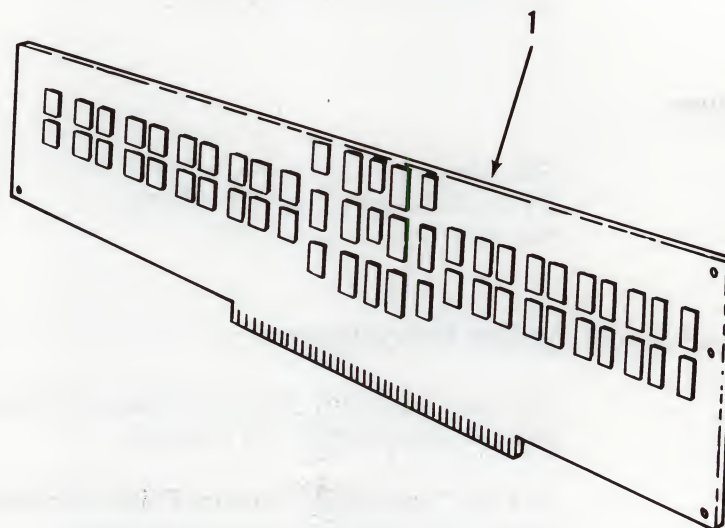
Slot positions	C, D
Bytes of memory	1.0M bytes
Memory type	ECC

### Removal and Replacement Procedures

Use the “Processor, Floating-Point, or System Memory Removal” on page 4-14 procedure for removal.

Use the “Processor, Floating-Point, or System Memory Replacement” on page 4-16 procedure for replacement.

## Parts Information



Index Number	Part Number	Description
1	6848223	RT PC 1MB Memory Expansion Option Note: Your RT PC 1MB Memory Expansion Option may look different than the drawing above. Look for "1MB ECC MEMORY" printed on the option.



---

## RT PC 2MB Memory Expansion Option

The RT PC 2MB Memory Expansion Option provides direct-addressable memory for the 32-bit processor.

### Specifications

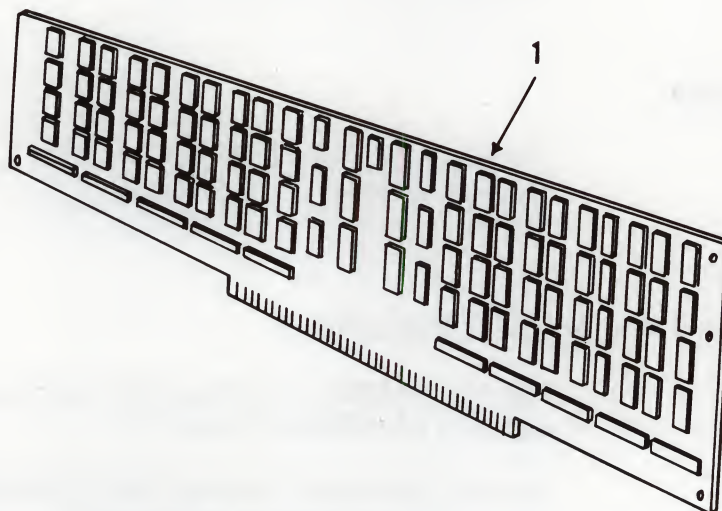
Slot positions	C, D
Bytes of memory	2.0M bytes
Memory type	ECC

### Removal and Replacement Procedures

Use the “Processor, Floating-Point, or System Memory Removal” on page 4-14 procedure for removal.

Use the “Processor, Floating-Point, or System Memory Replacement” on page 4-16 procedure for replacement.

## Parts Information



Index Number	Part Number	Description
1	6299228	RT PC 2MB Memory Expansion Option Note: Your RT PC 2MB Memory Expansion Option may look different than the drawing above. Look for "2MB ECC MEMORY" printed on the option.

---

## RT PC 4MB Memory Expansion Option

The RT PC 4MB Memory Expansion Option provides direct-addressable memory for the 32-bit processor.

### Specifications

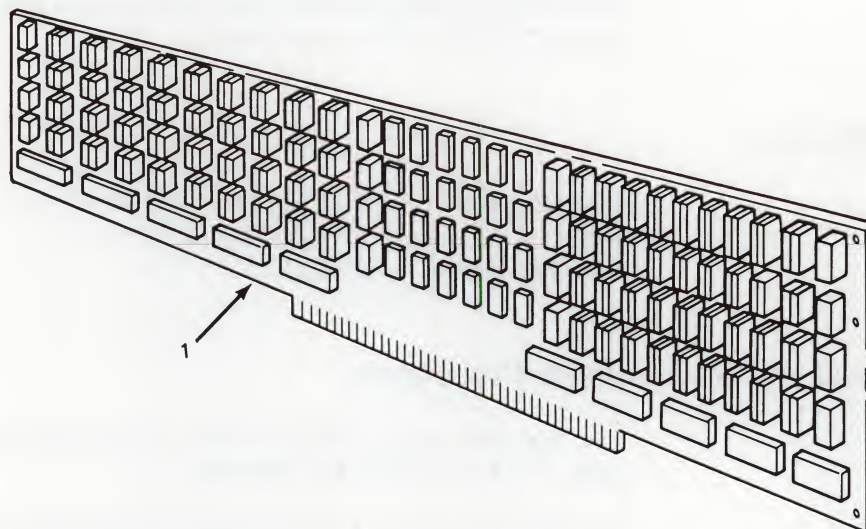
Slot positions	C, D
Bytes of memory	4.0M bytes
Memory type	ECC

### Removal and Replacement Procedures

Use the “Processor, Floating-Point, or System Memory Removal” on page 4-14 procedure for removal.

Use the “Processor, Floating-Point, or System Memory Replacement” on page 4-16 procedure for replacement.

## Parts Information



Index Number	Part Number	Description
1	61X6157	RT PC 4MB Memory Expansion Option Note: Your 4MB Memory Expansion Option may look different than the drawing above. Look for "4MB ECC MEMORY" printed on the option.



---

## **|RT PC 4MB Fast Memory Expansion Option**

|                   The RT PC 4MB Fast Memory Expansion Option provides  
| direct-addressable memory for the 32-bit processor. The RT PC 4MB Fast  
| Memory Expansion Option is used with the RT PC  
| Advanced Processor Board.

### **|Specifications**

Slot positions	C, D
Bytes of memory	4.0M bytes
Memory type	ECC

### **|Removal Procedure**

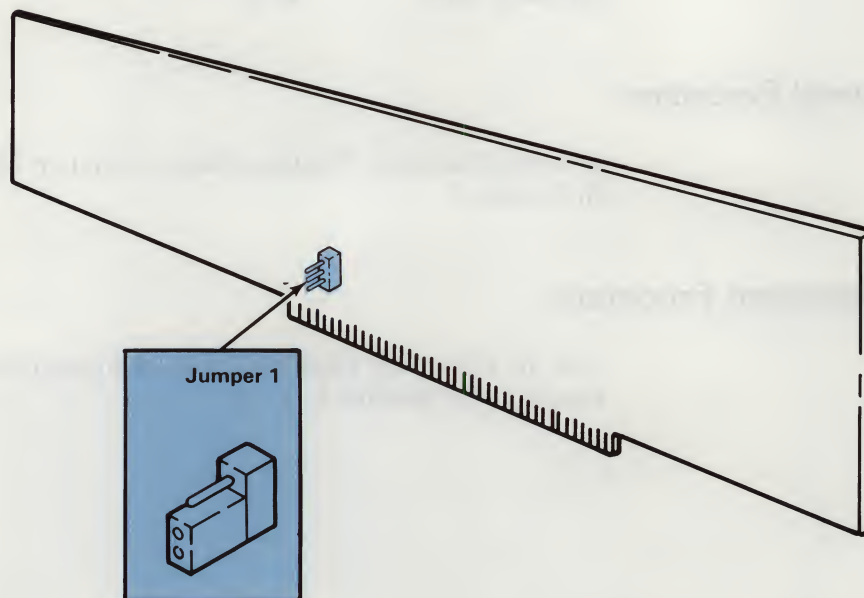
|                   Use the Processor, Floating-Point, or System Memory Removal procedure  
| in Section 4.

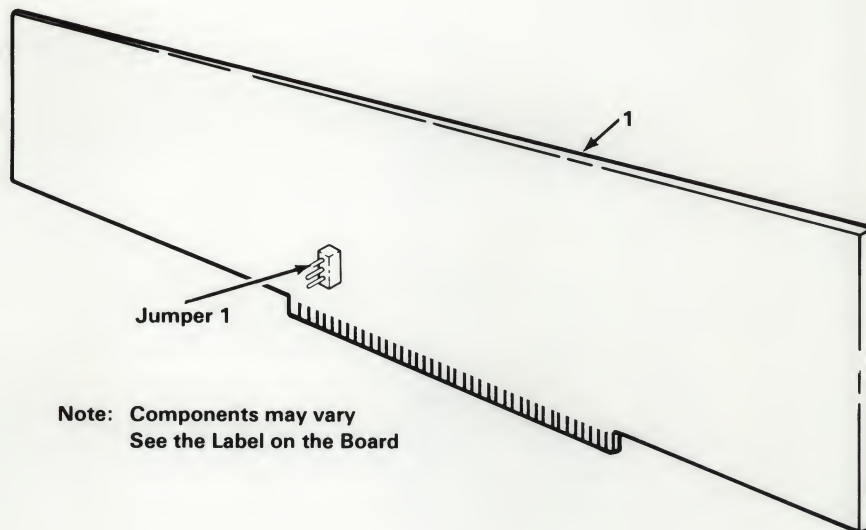
### **|Replacement Procedure**

|                   Use the Processor, Floating-Point, or System Memory Replacement  
| procedure in Section 4.

## Jumper Settings

Use the diagram below to set the memory access speed.



**Parts Information**

Note: Components may vary  
See the Label on the Board

Index Number	Part Number	Description
1	61X7005	RT PC 4MB Fast Memory Expansion Option Note: Look for "4MB ENHANCED ECC MEMORY" printed on the option.

REPLACEMENT PARTS



REPLACEMENT PARTS		QTY	UNIT
1. REPLACEMENT PARTS		1	EA
2. REPLACEMENT PARTS		1	EA
3. REPLACEMENT PARTS		1	EA
4. REPLACEMENT PARTS		1	EA
5. REPLACEMENT PARTS		1	EA
6. REPLACEMENT PARTS		1	EA
7. REPLACEMENT PARTS		1	EA
8. REPLACEMENT PARTS		1	EA
9. REPLACEMENT PARTS		1	EA
10. REPLACEMENT PARTS		1	EA



---

## **RT PC 8MB Fast Memory Expansion Option**

The RT PC 8MB Fast Memory Expansion Option provides direct-addressable memory for the 32-bit processor. The RT PC 8MB Fast Memory Expansion Option is used with the RT PC Advanced Processor Board.

### **Specifications**

Slot positions	D
Bytes of memory	8.0M bytes
Memory type	ECC

### **Removal Procedure**

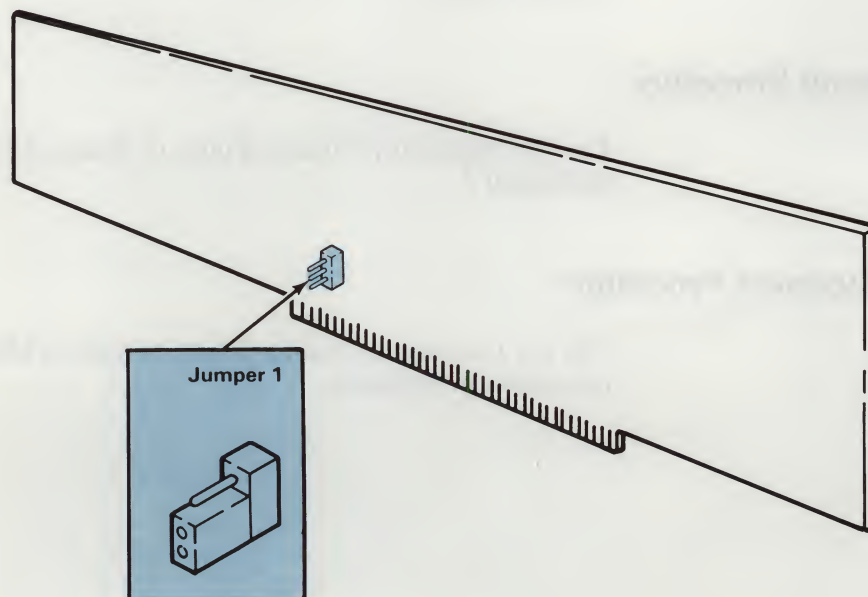
Use the Processor, Floating-Point, or System Memory Removal procedure in Section 4.

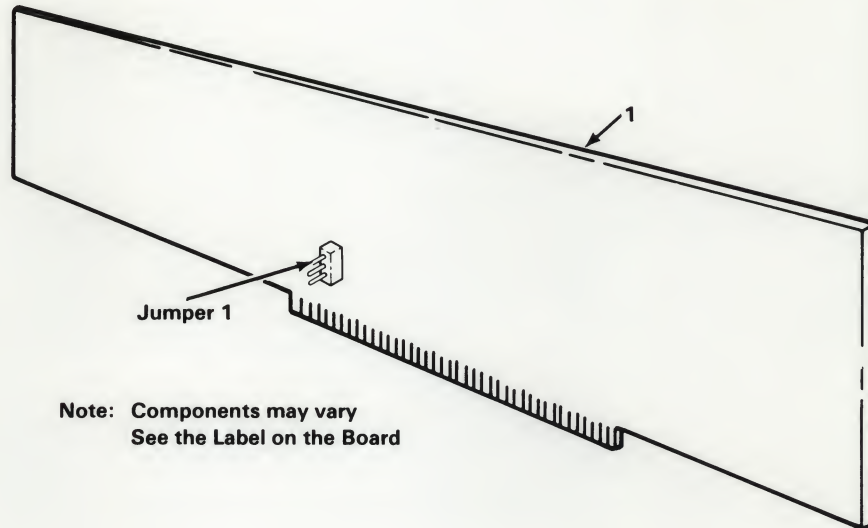
### **Replacement Procedure**

Use the Processor, Floating-Point, or System Memory Replacement procedure in Section 4.

## Jumper Settings

Use the diagram below to set the memory access speed.



**Parts Information**

**Note:** Components may vary  
See the Label on the Board

Index Number	Part Number	Description
1	61X7009	RT PC 8MB Fast Memory Expansion Option Note: Look for "8MB ENHANCED ECC MEMORY" printed on the option.

REVISIONS



REVISION	DATE	DESCRIPTION
1	03-27-87	Initial release
2	03-27-87	Revised to include 75X0152 and 75X0166



---

## **Section 7. Diskette Drive**



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Removal and Replacement Procedures .....	7-100-1
Terminator Resistor .....	7-100-2
Parts Information .....	7-100-3

---

## About this Section

This section contains information about the diskette drive used in the IBM 6151 System Unit.

The IBM 6151 System Unit can only have one diskette drive installed. The diskette drive is the IBM AT High Capacity Diskette Drive.

The fixed-disk drive and diskette drive share a fixed-disk and diskette drive adapter.

Pages in this section contain a 3-digit product code in the page number to make future updating easier.

---

## Handling a Diskette Drive

Read and become familiar with the following diskette drive *handling precautions*.

- Do not remove the antistatic bag from the drive until you are ready to install the drive in the system unit.
- Do not grasp the center part of the diskette drive when you are handling the drive. The squeezing action could damage the circuit board. Handle the drive by the frame only.
- Do not drop or lay the diskette drive down roughly, because that action may permanently damage the drive.

Observe the following general procedures, in addition to the specific procedures given in Section 4, to protect the drive from static discharges.

1. Lay the diskette drive (still wrapped in its antistatic bag) on a flat surface near the system unit.
2. Position yourself so you won't have to walk around while exchanging the drive. This helps prevent the generation of static electricity.
3. Touch a metal part of your system unit with one hand and the antistatic bag with the other hand. This will place your body, the drive, and the system unit at the same ground potential, thus preventing an accidental static discharge.
4. Slide the antistatic bag off of the diskette drive.
5. Handle the diskette drive by the frame only while installing or removing it. It is recommended that you use both hands to reduce the chance of dropping the drive.
6. Put the exchanged diskette drive back in the antistatic bag.



---

## IBM AT High Capacity Diskette Drive

The IBM AT High Capacity Diskette Drive can store up to 1.2M bytes of formatted data on a Double-Sided, Cobalt-Enhanced Oxide-Coated Diskette. This drive is a single field-replaceable unit.

### Specifications

Diskette type	5.25 inch, double-sided, cobalt-enhanced oxide-coating
Total tracks	160 (80 tracks per side)
Sectors per track	15
Bytes per sector	512
Tracks per inch	96
Maximum number	1
Adapter	IBM AT Fixed-Disk and Diskette Drive Adapter or RT PC ESDI Magnetic Media Adapter

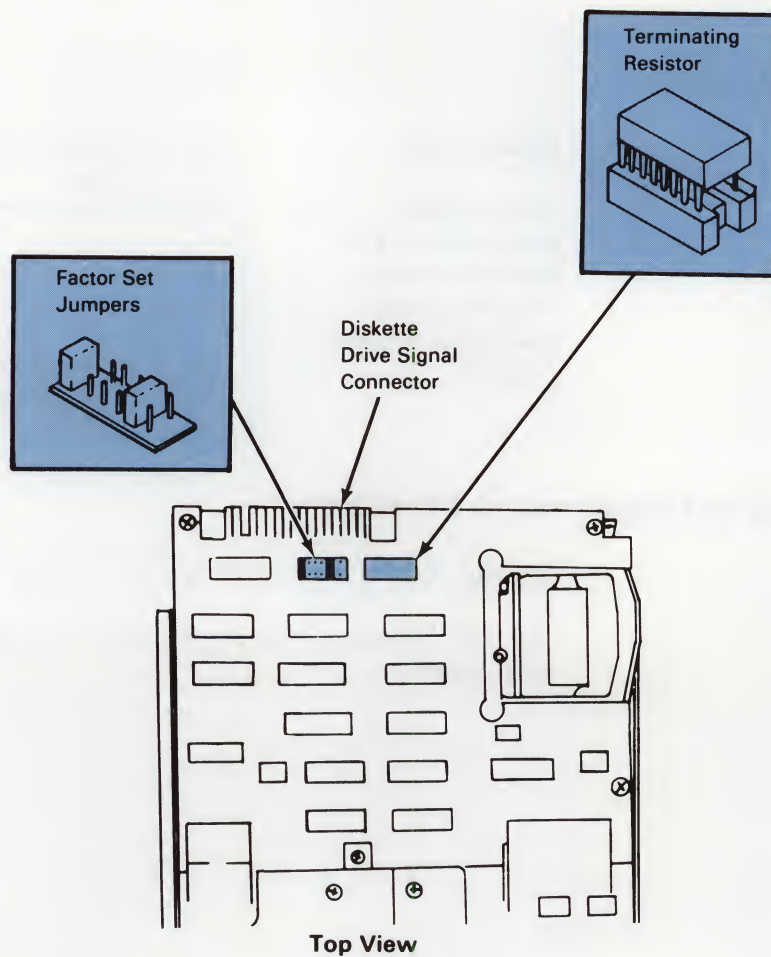
### Removal and Replacement Procedures

Use the "Diskette Drive Removal" on page 4-26 procedure for removal.

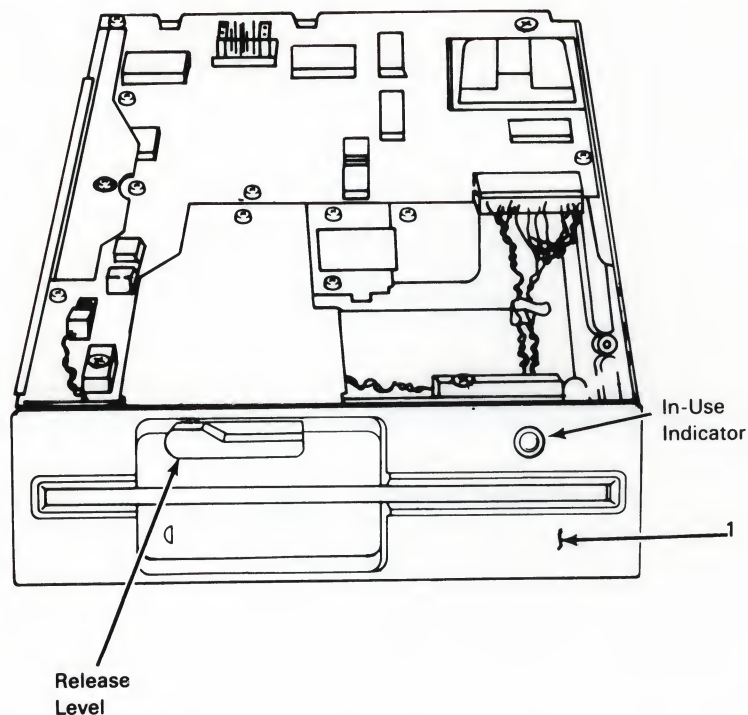
Use the "Diskette Drive Replacement" on page 4-28 procedure for replacement.

## Terminator Resistor

Use the diagram below to identify and install the terminator resistor.



## Parts Information



Index Number	Part Number	Description
1	8286130 68X3752 61X6800	IBM AT High Capacity Diskette Drive IBM AT High Capacity Diskette Drive, WT Cable, fixed-disk and diskette drive





## **Section 8. Fixed-Disk Drives**

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Parts Information .....	8-130-3

---

## About this Section

This section provides information about the fixed-disk drives used in the IBM 6151 System Unit. The system unit has only one fixed-disk drive.

The fixed-disk drive and diskette drive share a fixed-disk and diskette drive adapter. If needed, see Section 9 for information about the diskette drive adapters.

This section is arranged by fixed-disk drive type.

Pages in this section contain a 3-digit product code in the page number to make future updating easier.

---

## Handling a Fixed-Disk Drive

Read and become familiar with the following fixed-disk drive *handling precautions*.

- Do not remove the antistatic bag from the drive until you are ready to install the drive in the system unit.
- Do not grasp the center part of the fixed-disk drive when you are handling the drive. The squeezing action could damage the circuit board. Handle the drive by the frame only.
- Do not drop or lay the fixed-disk drive down roughly, because that action may permanently damage the drive.

Observe the following general procedures, in addition to the specific procedures given in Section 4, to protect the drive from static discharges.

1. Lay the fixed-disk drive (still wrapped in its antistatic bag) on a flat surface near the system unit.
2. Position yourself so you won't have to walk around while exchanging the drive. This helps prevent the generation of static electricity.
3. Touch a metal part of your system unit with one hand and the antistatic bag with the other hand. This will place your body, the drive, and the system unit at the same ground potential, thus preventing an accidental static discharge.
4. Slide the antistatic bag off of the fixed-disk drive.
5. Handle the fixed-disk drive by the frame only while installing or removing it. It is recommended that you use both hands to reduce the chance of dropping the drive.
6. Put the exchanged fixed-disk drive back in the antistatic bag.



---

## Fixed-Disk Drive Type R40

The Fixed-Disk Drive Type R40 has a storage capacity of at least 40M bytes of formatted data.

There are no adjustments or individually field-replaceable parts on this drive.

### Specifications

Disk Size	5.25 inch fixed disk
Maximum number	1
Adapter	IBM AT Fixed-Disk and Diskette Drive Adapter

### Removal and Replacement Procedures

Use the "Fixed-Disk Drive Removal" on page 4-30 procedure for removal.

Use the "Fixed-Disk Drive Replacement" on page 4-32 procedure for replacement.

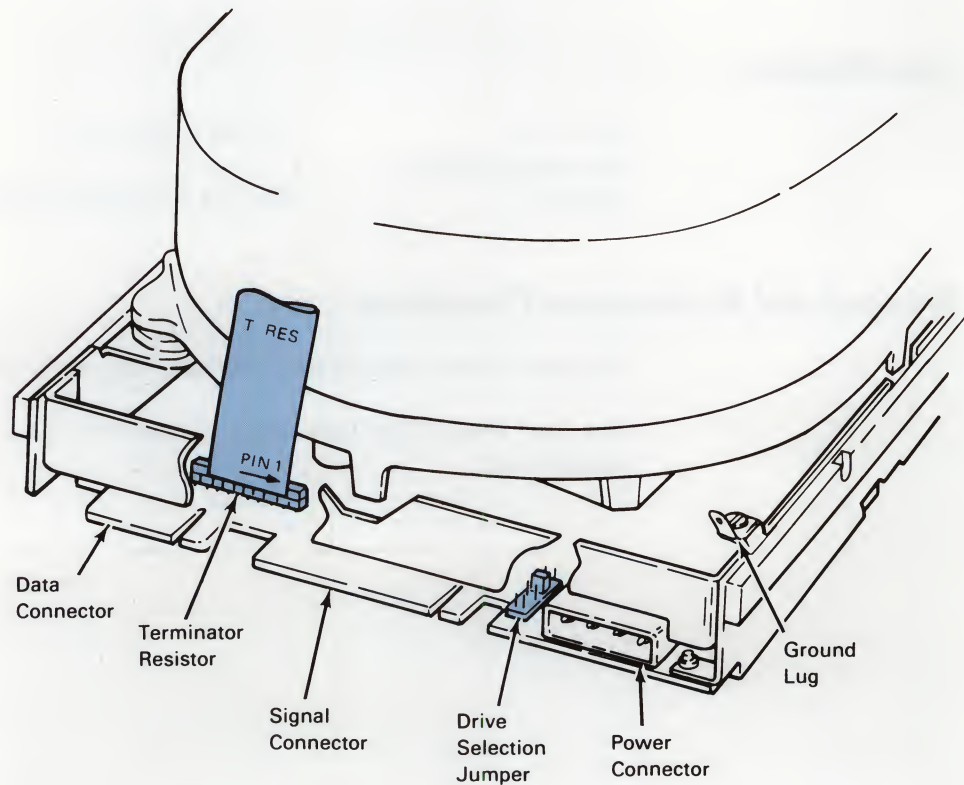
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## Terminator Resistor

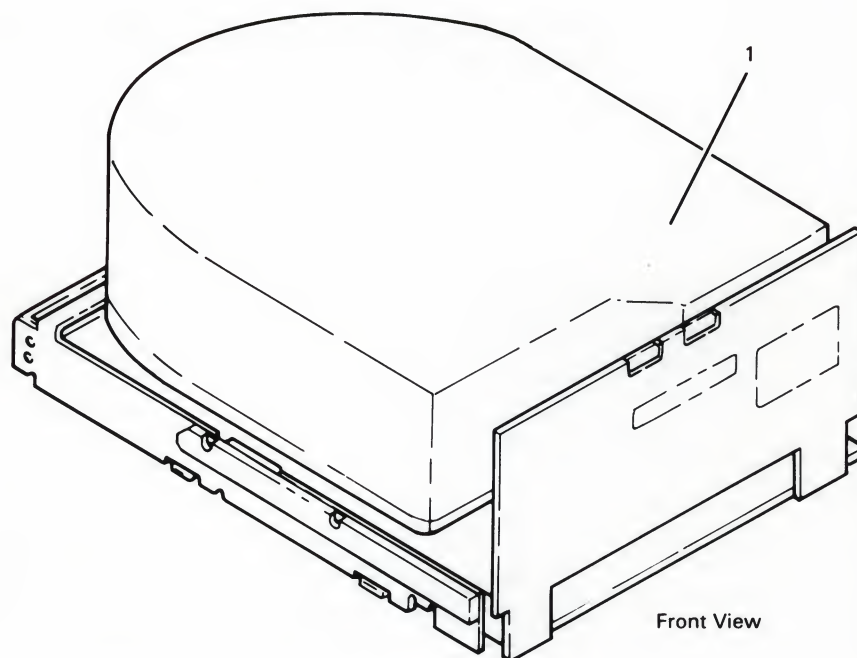
Use the diagram below to identify, install, or remove terminator resistor on the type R40 drive.

Set the drive selection jumper as shown.

---



## Parts Information



Index Number	Part Number	Description
1	6299235 61X6800	Fixed-disk drive type R40 Cable, fixed-disk and diskette drive





---

## Fixed-Disk Drive Type R70

The Fixed-Disk Drive Type R70 has a storage capacity of at least 70M bytes of formatted data.

There are no adjustments or individually field-replaceable parts on this drive.

### Specifications

Drive positions	IBM 6150 - C, D, E IBM 6151 - C
Disk Size	5.25 inch fixed disk
Maximum number	IBM 6150 - 3 IBM 6151 - 1
Adapter	RT PC ESDI Magnetic Media Adapter

### Removal Procedure

Use the Fixed-Disk Drive Removal procedure in Section 4.

### Replacement Procedure

Use the Fixed-Disk Drive Replacement procedure in Section 4.

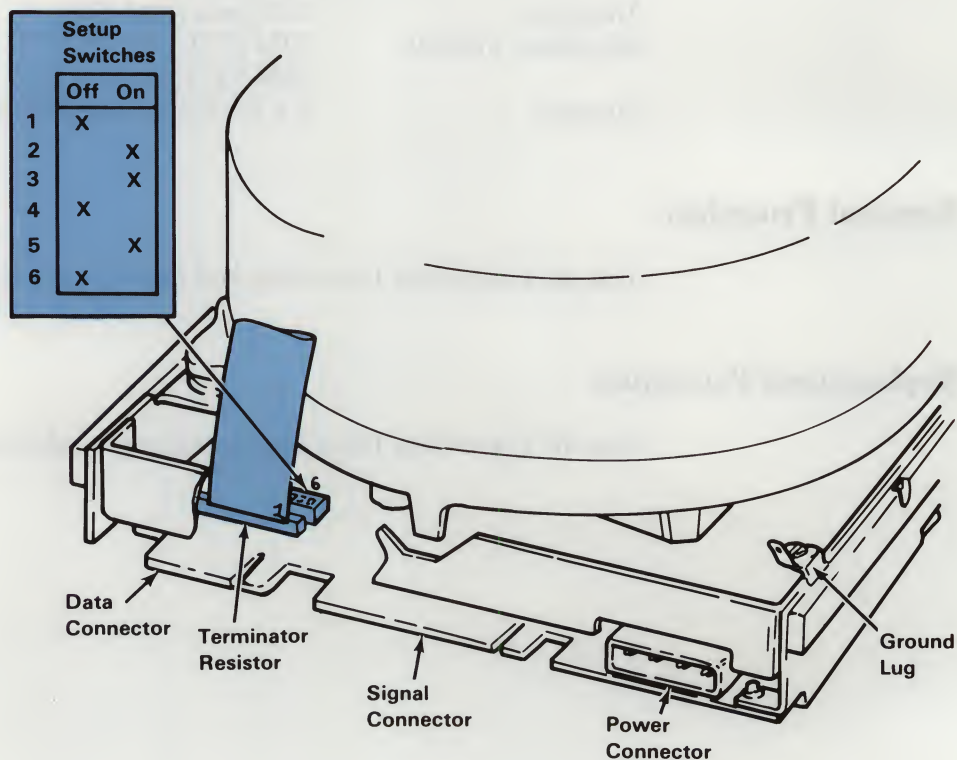
## Terminator Resistor

Use the diagram below to identify, install, or remove the terminator resistor on the type R70 drive.

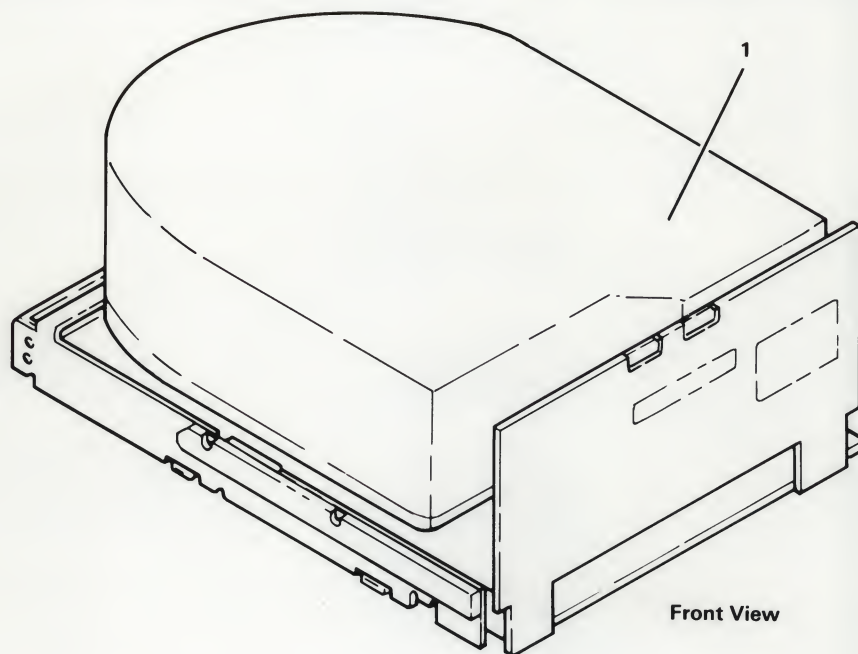
Install the terminator resistor if the drive is for fixed-disk drive position C or E.

Remove the terminator resistor if the drive is for fixed-disk drive position D.

Set the drive setup switches as shown.



## Parts Information



Index Number	Part Number	Description
1	61X6942 61X6937 61X6938 6298359	Fixed-disk drive type R70 Cable, fixed-disk and diskette drive positions A - D Cable, fixed-disk drive position E Cable, power distribution





## Fixed-Disk Drive Type E70

The Fixed-Disk Drive Type E70 has a storage capacity of at least 70M bytes of formatted data.

This fixed-disk drive is physically the same as the Fixed-Disk Drive Type R70, but the formatting is different. The type R70 and E70 fixed-disk drives *are not* interchangeable.

There are no adjustments or individually field-replaceable parts on this drive.

## Specifications

Drive positions	IBM 6150 - C, D, E IBM 6151 - C
Disk Size	5.25 inch fixed disk
Maximum number	IBM 6150 - 3 IBM 6151 - 1
Adapter	Extended ESDI Magnetic Media Adapter

## Removal Procedure

Use the Fixed-Disk Drive Removal procedure in Section 4.

## Replacement Procedure

Use the Fixed-Disk Drive Replacement procedure in Section 4.

## Terminator Resistor

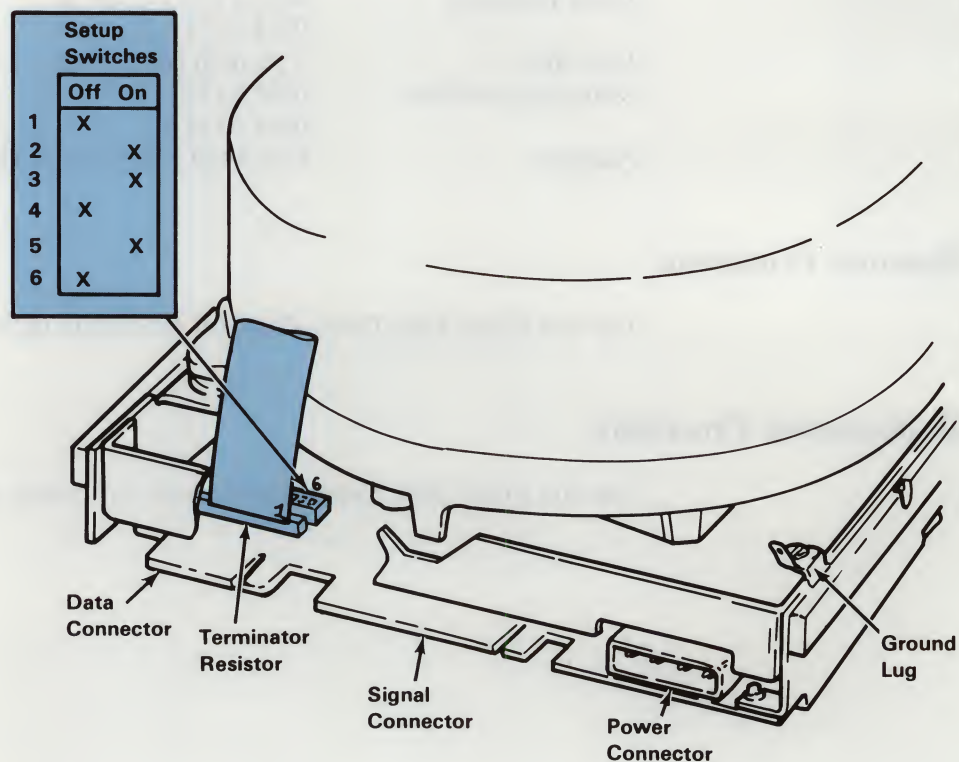
Use the diagram below to identify, install, or remove the terminator resistor on the type E70 drive.

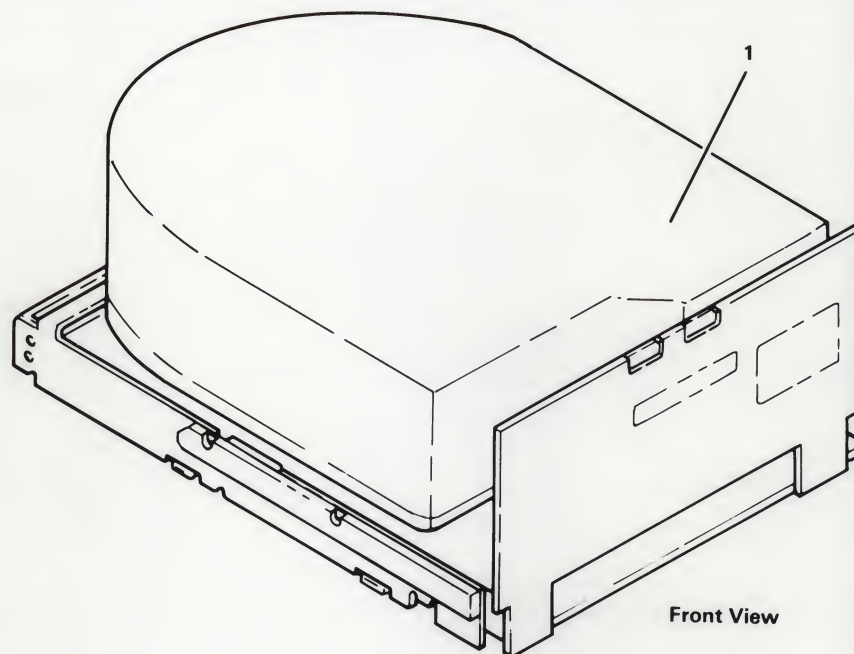
For the IBM 6150, install the terminator resistor if the drive is for fixed-disk drive position C.

For the IBM 6150, remove the terminator resistor if the drive is for fixed-disk drive position D or E.

For the IBM 6151, install the terminator resistor.

Set the drive setup switches as shown.



**Parts Information**

Index Number	Part Number	Description
1	79X3989 79X3777 6298359 61X6800	Fixed-disk drive type E70 Fixed-disk and diskette drive cable A - E, IBM 6150 Power distribution cable, IBM 6150 Fixed-disk and diskette drive cable, IBM 6151





## **Section 9. Adapters**

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## About this Section

This section contains detail information about adapters used in the IBM 6150 System Unit. Use the contents list on the preceding pages to find the information about your adapter.

Pages in this section contain a 3-digit product code in the page number to make future updating easier.

---

## IBM AT 512 KB Memory Expansion Option

The IBM AT 512 KB Memory Expansion Option plugs into a system board adapter slot and uses the I/O channel to communicate with the Personal Computer AT Coprocessor Option or the 32-bit processor.

### Specifications

Slot positions	2 - 4
Maximum number	1

### Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal of the option. If the problem is isolated to a single failing module, pry up on the ends of the module to remove it. Alternate between the ends of the module to prevent bending the pins.

If you removed a single module, align the notched end of the module with the notched end of the socket, then press into position. Be sure all of the pins are in the socket and no pin is bent.

Use the "Adapter Replacement" on page 4-20 procedure for replacement of the option.

---

## Switch Settings

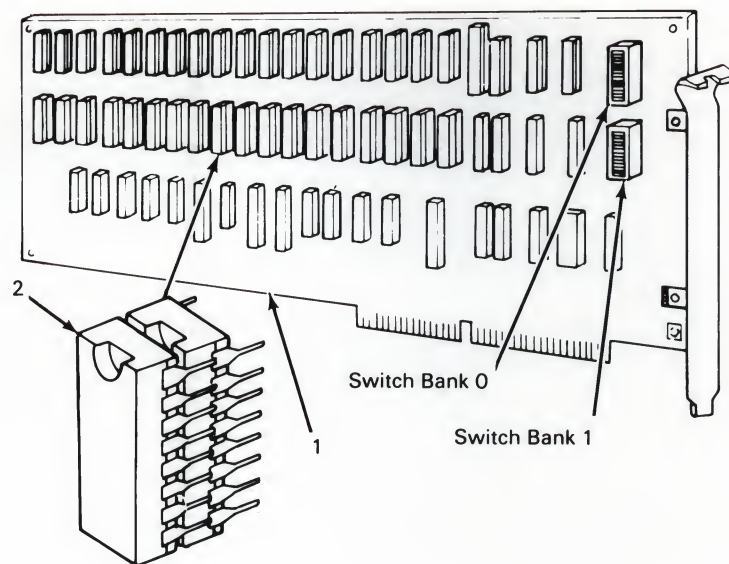
Use the drawing on the next page to locate the switch banks, then use the chart below to set the switches.

### IBM AT 512 KB Memory Expansion Option Switch Settings

	Bank 0		Bank 1	
	Off	On	Off	On
Switch 1	X		X	
Switch 2	X		X	
Switch 3	X		X	
Switch 4	X		X	
Switch 5	X		X	
Switch 6	X		X	
Switch 7	X		X	
Switch 8	X		X	



## Parts Information



Index Number	Part Number	Description
1	8286115	IBM AT 512 KB Memory Expansion Option Module, 128K bits (1 each)
2	8286139	



---

## RT PC AT Coprocessor Option

The RT PC AT Coprocessor Option runs programs designed for the IBM Personal Computer. The coprocessor uses the I/O channel to communicate with the 32-bit processor, system memory, adapters, or the IBM AT 512 KB Memory Expansion Option.

The IBM AT Math Co-Processor attaches to the RT PC AT Coprocessor Option to improve the numerical capability of the coprocessor.

### Specifications

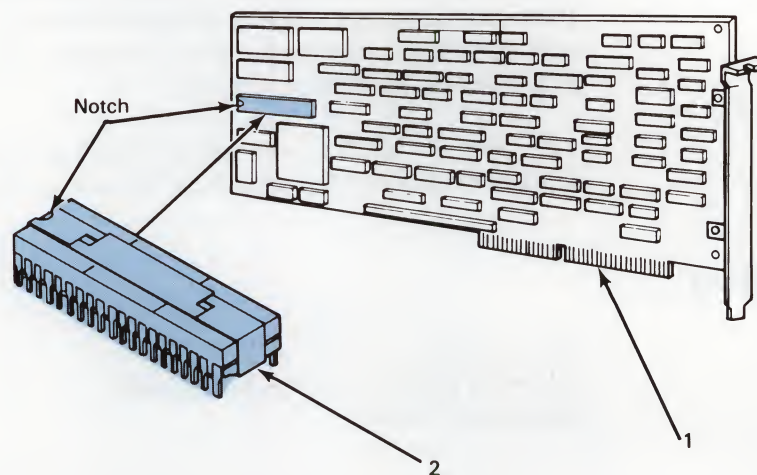
Slot position	5
Interrupt level	15 (shared)
Maximum number	1

### Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal of the coprocessor. If the IBM AT Math Co-Processor is present, pry up on the ends of the module to remove it.

Use the "Adapter Replacement" on page 4-20 procedure for replacement of the coprocessor. If the IBM AT Math Co-Processor is present, align the notched end of the module with notched end of the socket and push down.

## Parts Information



Index Number	Part Number	Description
1	6299226	RT PC AT Coprocessor Option
2	8286127	IBM AT Math Co-Processor module



---

## IBM AT Fixed-Disk and Diskette Drive Adapter

The IBM AT Fixed-Disk and Diskette Drive Adapter contains adapters for two diskette drives and two fixed-disk drives.

### Specifications

Slot position	6
I/O addresses	Diskette, 03F0 - 03F7 Fixed-disk, 01F0 - 01F7
DMA channel	Diskette drive, 2
Interrupt levels	Diskette drive, 6 Fixed-disk drive, 14
Maximum number	1

### Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal.

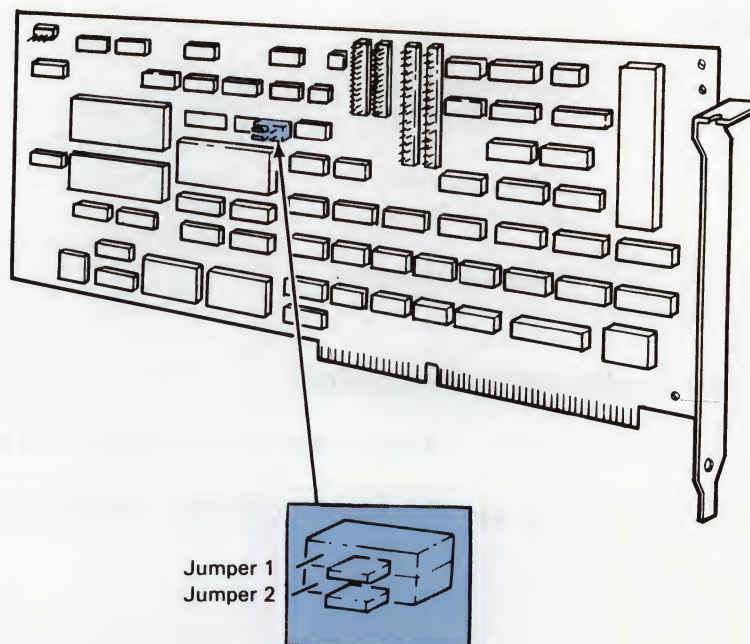
Use the "Adapter Replacement" on page 4-20 procedure for replacement.

---

## Jumper Settings

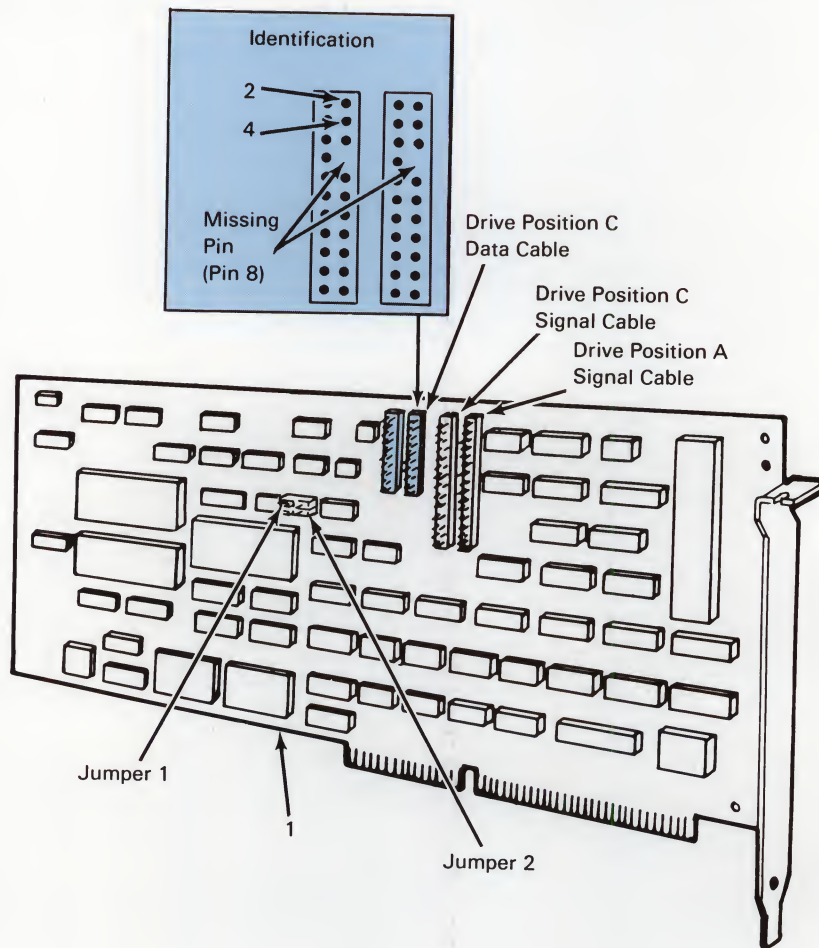
Use the diagram below to set the jumpers for the adapter.

---





## Parts Information





Index Number	Part Number	Description
1	8286125 61X6800	IBM AT Fixed-Disk and Diskette Drive Adapter Cable, fixed-disk and diskette drive



---

## RT PC ESDI Magnetic Media Adapter

The RT PC ESDI Magnetic Media Adapter contains adapters for two diskette drives and two fixed-disk drives.

### Specifications

Slot position	6
I/O addresses	Diskette drive, 03F0 - 03F7 Fixed-disk drive, 01F0 - 01F7
DMA channel	Diskette drive, 2
Interrupt levels	Diskette drive, 6 Fixed-disk drive, 14
Maximum number	

### Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal.

Use the "Adapter Replacement" on page 4-20 procedure for replacement.

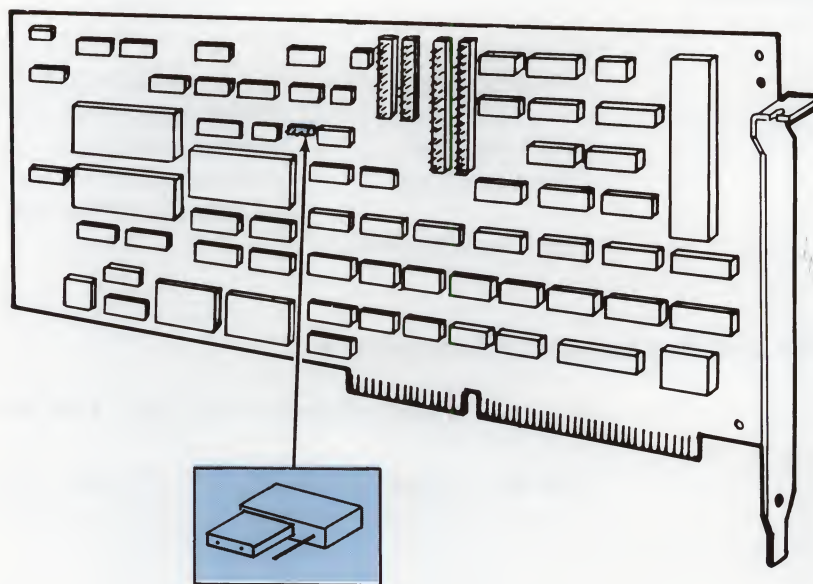
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## Jumper Settings

Use the diagram below to set the jumper for the adapter.

The jumper sets the I/O addresses of the adapter.

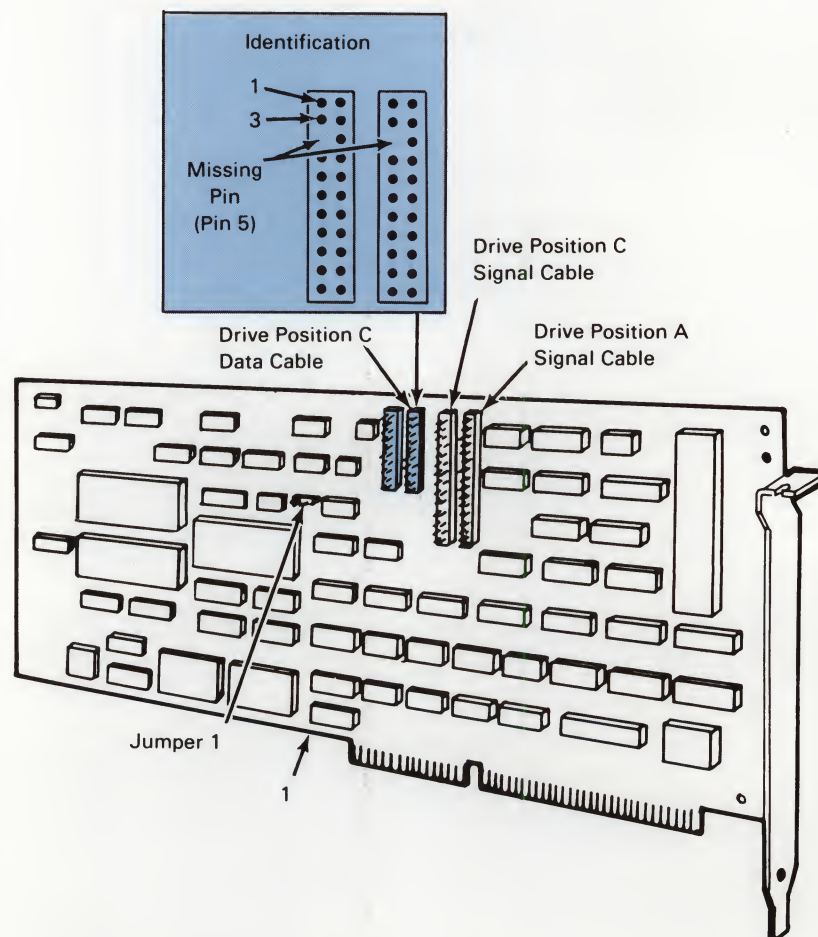
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## Parts Information



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Index Number	Part Number	Description
1	61X6351 61X6800	RT PC ESDI Magnetic Media Adapter Cable, fixed-disk and diskette drive





## **|RT PC Extended ESDI Magnetic Media Adapter**

| The RT PC Extended ESDI Magnetic Media Adapter contains adapters for two diskette drives and three fixed-disk drives.

### **|Specifications**

Slot positions	IBM 6150, slots 1 IBM 6151, slot 6
I/O addresses	Drive positions A and B, 03F0 - 03F7 Drive positions C, D, and E, 01F0 - 01F7
DMA channel	Diskette drives, 2 Fixed-disk drives, 0, 1 (set by program)
Interrupt level	Diskette drives, 6 Fixed-disk drives, 12, 14 (set by program)

### **|Removal Procedure**

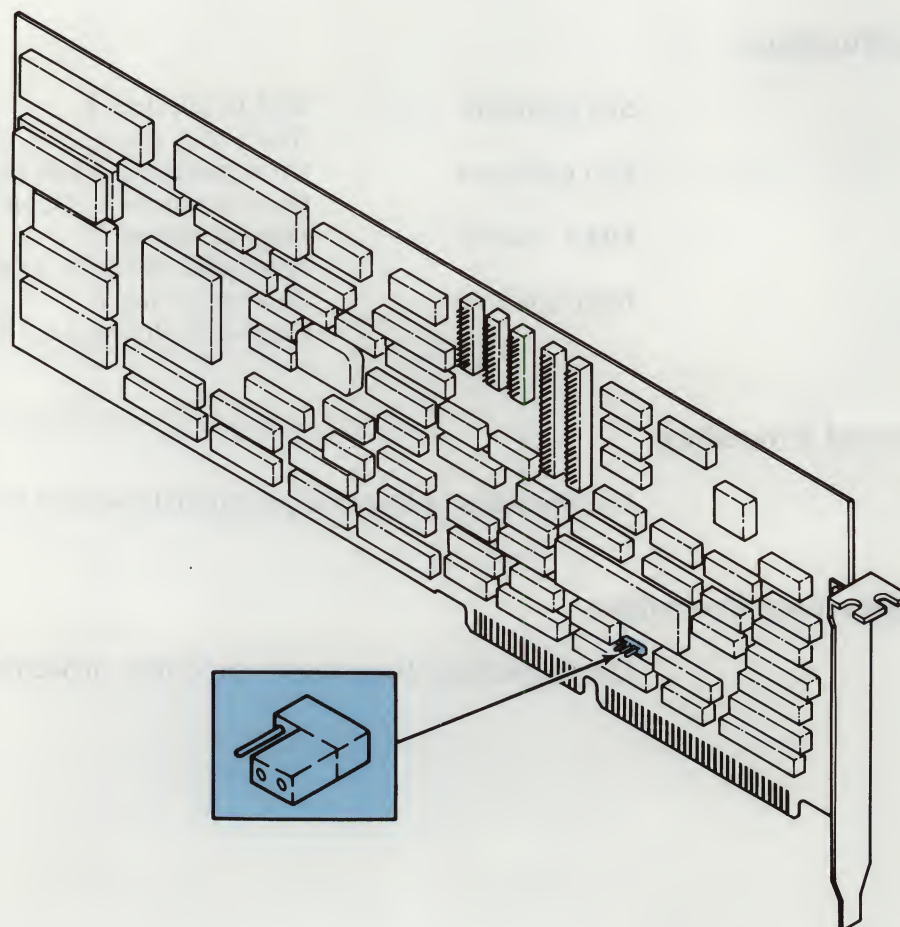
| Use the Adapter Removal procedure in Section 4.

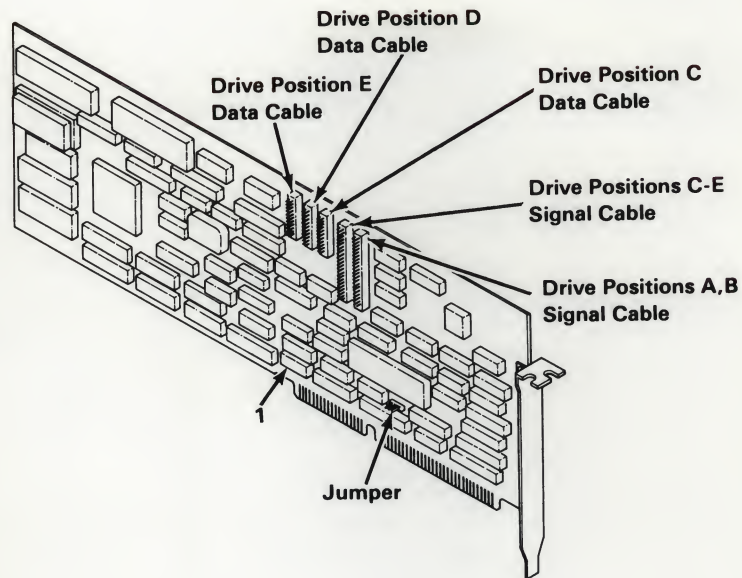
### **|Replacement Procedure**

| Use the Adapter Replacement procedure in Section 4.

## Jumper Settings

Use the diagram below to set the jumper as shown.



**Parts Information**

Index Number	Part Number	Description
1	6848231 79X3777 61X6800	RT PC Extended ESDI Magnetic Media Adapter Fixed-disk and diskette drive cable A - E, IBM 6150 Fixed-disk and diskette drive cable, IBM 6151

Illustration 17a-11



Description	Part Number	Quantity
1. Drive shaft	100-1000	1
2. Drive pulley	100-1000	1
3. Drive belt	100-1000	1



---

## IBM Monochrome Display and Printer Adapter

The IBM Monochrome Display and Printer Adapter is the same adapter that is used in the IBM Personal Computer system units to attach the IBM 5151 Personal Computer Display.

### Specifications

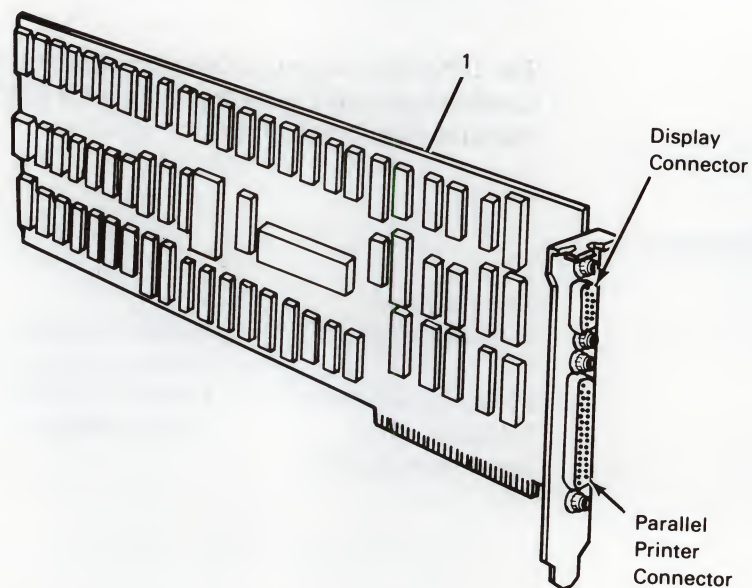
Slot positions	1
I/O addresses	Display adapter, 03B0 - 03BA Printer adapter, 03BB - 03BF
Memory addresses	Display, 0B0000 - 0B7FFF
Interrupt level	Printer adapter, 7
Maximum number	1

### Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal.

Use the "Adapter Replacement" on page 4-20 procedure for replacement.

## Parts Information



Index Number	Part Number	Description
1	8529148 8529214	IBM Monochrome Display and Printer Adapter IBM PC Parallel Printer Cable

---

## IBM PC Enhanced Graphics Adapter

The IBM PC Enhanced Graphics Adapter attaches the IBM 5154 Enhanced Color Display to the system unit. The IBM PC Enhanced Graphics Adapter contains 64K bytes of display memory. The display memory size can be expanded to 256K bytes by adding the IBM PC Graphics Memory Expansion Card (64K bytes) and IBM PC Graphics Memory Expansion Kit (128K bytes) to the adapter.

### Specifications

Slot positions	1
I/O addresses	03C0 - 03DF
Memory addresses	0A0000 - 0BFFFF
BIOS addresses	0C0000 - 0C3FFF
Interrupt level	9
Maximum number	1

### Removal and Replacement Procedures

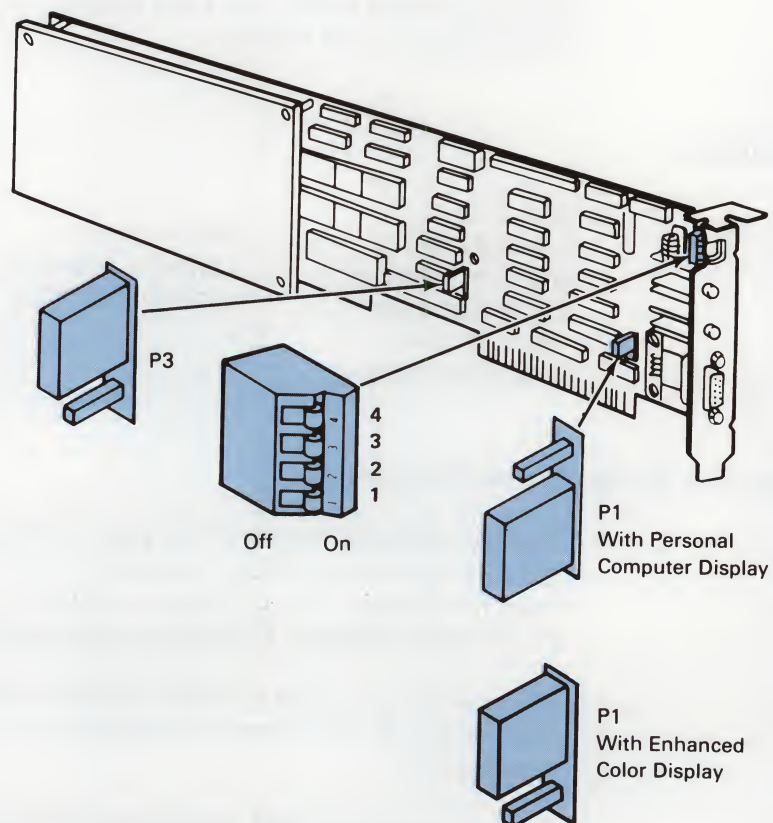
Use the "Adapter Removal" on page 4-18 procedures for removal. If the IBM PC Graphics Memory Expansion Card is present, remove the card from the adapter. If your failure is isolated to a failing module on the IBM PC Graphics Memory Expansion card, remove the failing module.

If you removed a failing module, align the failing module with the socket (be sure the notch is in the same direction as the other modules), then press it into position.

If you removed the IBM PC Graphics Memory Expansion Card, install it on the adapter. Then, use the "Adapter Replacement" on page 4-20 procedures for replacement.

## Jumper Settings

Use the diagram below to set the jumpers. Use the chart on the following page to set the mode switch.





## Switch Settings

Use this table to set the mode switches for the type of display attached to the IBM PC Enhanced Graphics Adapter when *one* of the following conditions is present:

- The RT PC AT Coprocessor Option *is not* installed.
- The display attached to the IBM PC Enhanced Graphics Adapter is not assigned to the RT PC AT Coprocessor Option.
- The display attached to the IBM PC Enhanced Graphics Adapter is assigned to the RT PC AT Coprocessor Option in *shared* mode.

Type of Display Attached to the IBM PC Enhanced Graphics Adapter	Sw1	Sw2	Sw3	Sw4
IBM 5154 Enhanced Color Display	Off	On	On	Off
IBM 5151 Personal Computer Display	Off	Off	On	Off

Use this table to set the mode switches when the following conditions are present:

- The IBM 5151 Personal Computer Display is attached to the IBM PC Enhanced Graphics Adapter.
- The IBM 5151 is assigned to the RT PC AT Coprocessor Option in *dedicated* mode.
- Another display may also be installed and assigned to the RT PC AT Coprocessor Option as a second display.

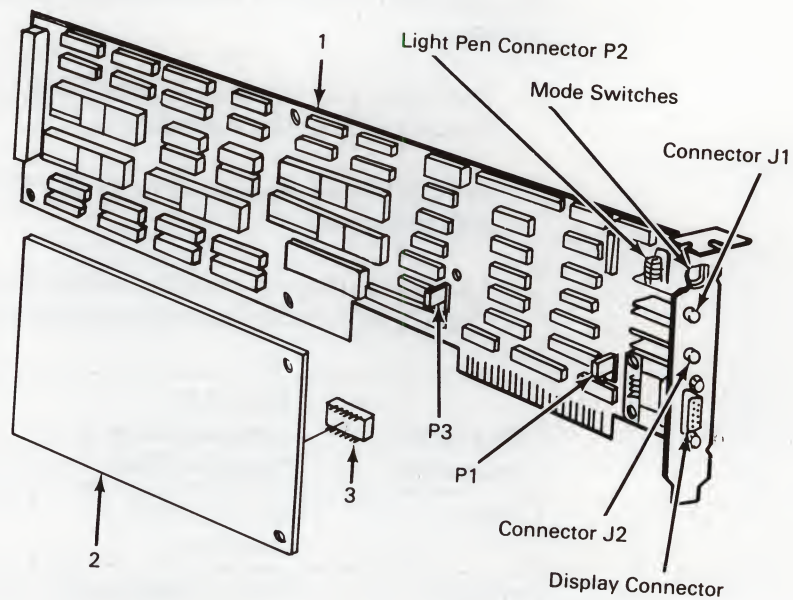
IBM 5151 Assignment	Second Display Mode of Operation	Sw1	Sw2	Sw3	Sw4
Primary	80 X 25 Color	Off	Off	On	Off
Primary	40 X 25 Color	On	Off	On	Off
Secondary	80 X 25 Color	Off	On	Off	On
Secondary	40 X 25 Color	On	On	Off	On

Use this table to set the mode switches when the following conditions are present:

- The IBM 5154 Enhanced Color Display is attached to the IBM PC Enhanced Graphics Adapter.
- The IBM 5154 is assigned to the RT PC AT Coprocessor Option in *dedicated* mode.
- Another display may also be installed and assigned to the RT PC AT Coprocessor Option as a second display.

IBM 5154 Assignment	IBM 5154 Operating Mode or Emulation Mode	Sw1	Sw2	Sw3	Sw4
Primary	80 X 25 High Resolution	Off	On	On	Off
Primary	80 X 25 Enhanced Color	On	On	On	Off
Secondary	80 X 25 High Resolution	Off	Off	On	On
Secondary	80 X 25 Enhanced Color	On	Off	On	On

## Parts Information



Index Number	Part Number	Description
1	8654215	IBM PC Enhanced Graphics Adapter
2	6323468	IBM PC Graphics Memory Expansion Card
3	8654219	Module (1 each)



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## RT PC Advanced Monochrome Graphics Display Adapter

The RT PC Advanced Monochrome Graphics Display Adapter attaches the Advanced Monochrome Graphics Display to the system unit.

### Specifications

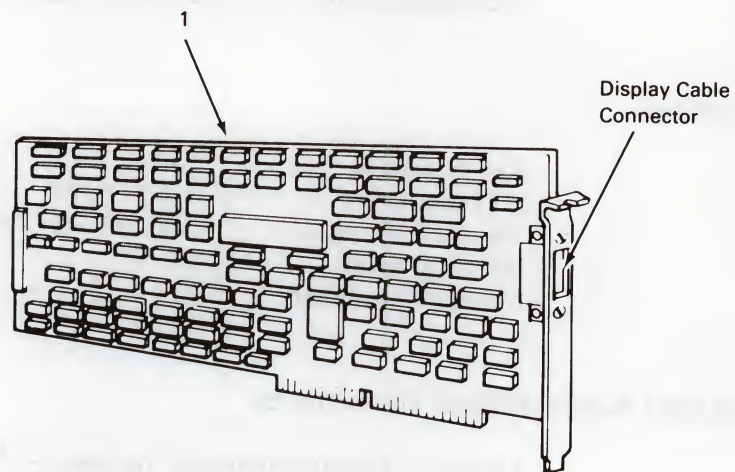
Slot positions	2 - 5
I/O addresses	0160 - 016F
Memory addresses	D00000 - D1FFFF
Interrupt level	11
Maximum number	1

### Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal.

Use the "Adapter Replacement" on page 4-20 procedure for replacement.

## Parts Information



Index Number	Part Number	Description
1	6299223	RT PC Advanced Monochrome Graphics Display Adapter

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## RT PC Advanced Color Graphics Display Adapter

The RT PC Advanced Color Graphics Display Adapter attaches the IBM 6154 Advanced Color Graphics Display to the IBM 6151 System Unit.

### Specifications

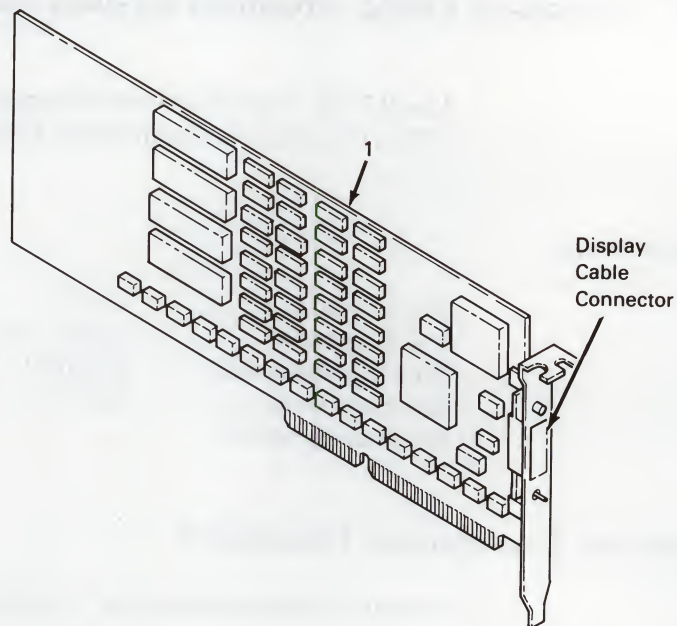
Slot positions	2 - 5
I/O addresses	0150 - 015F
Memory addresses	D20000 - D3FFFF
Interrupt level	11
Maximum number	1

### Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal.

Use the "Adapter Replacement" on page 4-20 procedure for replacement.

## Parts Information



Index Number	Part Number	Description
1	6299392	RT PC Advanced Color Graphics Display Adapter



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## RT PC Extended Monochrome Graphics Display Adapter

The RT PC Extended Monochrome Graphics Display Adapter attaches the IBM 6155 Extended Monochrome Graphics Display to the IBM 6151 System Unit.

### Specifications

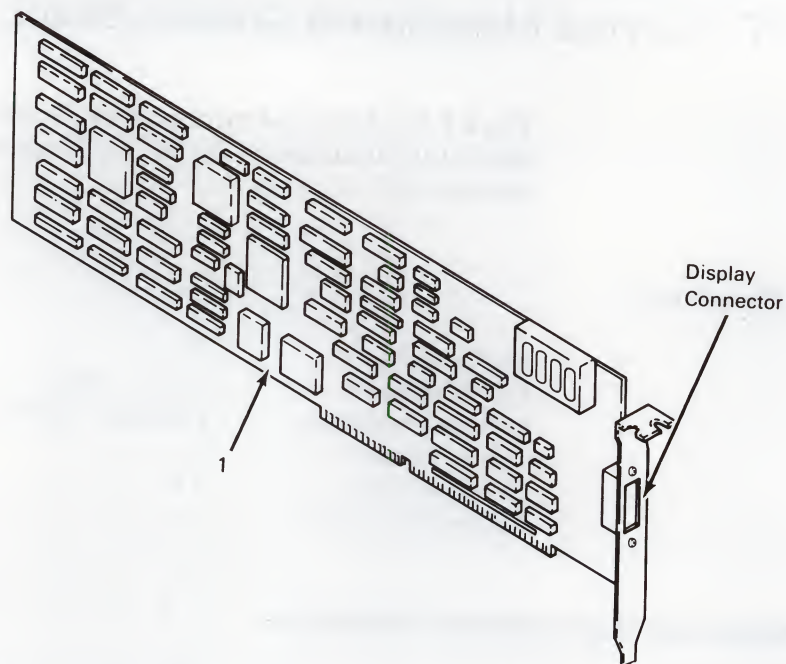
Slot positions	2 - 4
I/O addresses	0D10 - 0D2F
Memory addresses	D80000 - DFFFFFF
DMA channel	7
Interrupt level	11
Maximum number	1

### Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal.

Use the "Adapter Replacement" on page 4-20 procedure for replacement.

## Parts Information



Index Number	Part Number	Description
1	6299351	RT PC Extended Monochrome Graphics Display Adapter

## IBM Megapel Display Adapter

The IBM Megapel Display Adapter attaches the IBM 5081 Display to the RT PC system unit. The IBM Megapel Display Adapter consists of two boards, the display controller board and the display processor board. They are physically attached and plug into two adjacent double slots.

The display controller board produces the red, green, and blue (RGB) video signals for the IBM 5081 Display.

The display processor board provides the processing function for the display controller board. It also contains a parallel printer adapter.

**Note:** The parallel printer adapter on the IBM Megapel Display Adapter must be *disabled* (see switch settings) if the IBM Monochrome Display and Printer Adapter is installed in the system unit.

## Specifications

Slot positions	IBM 6150, slots 4 and 5 IBM 6151, slots 2 and 3
I/O addresses	0930 – 094F
Memory addresses	0B8000 – 0BBFFF, PC color graphics adapter emulation mode C00000 – C3FFFF, Adapter data space D60000 – D7FFFF, Adapter program space
DMA channels	7
Interrupt level	11 (shared)
Horizontal frequency	63.36 KHz
Vertical frequency	60 Hz, non-interlaced
Display connector	3-Pin video
Printer connector	25-Pin D-shell
Maximum number	1



## | Removal Procedure

| **Note:** The IBM Megapel Display Adapter consists of two boards  
| fastened together. Use care when removing or disconnecting them.

- | 1. Use the Adapter Removal Procedure in Section 4 to remove the  
| adapter.
- | 2. Record the switch settings (on the processor and printer adapter  
| board).
- | 3. Remove the four screws that attach the display processor board (the  
| one with the 25-pin connector) to the display controller board.
- | 4. Disconnect the display processor board.
- | 5. Exchange either board, then use the following procedure to assemble.

## | Replacement Procedure

| **Note:** The IBM Megapel Display Adapter consists of two boards  
| fastened together. Use care when connecting or installing them.

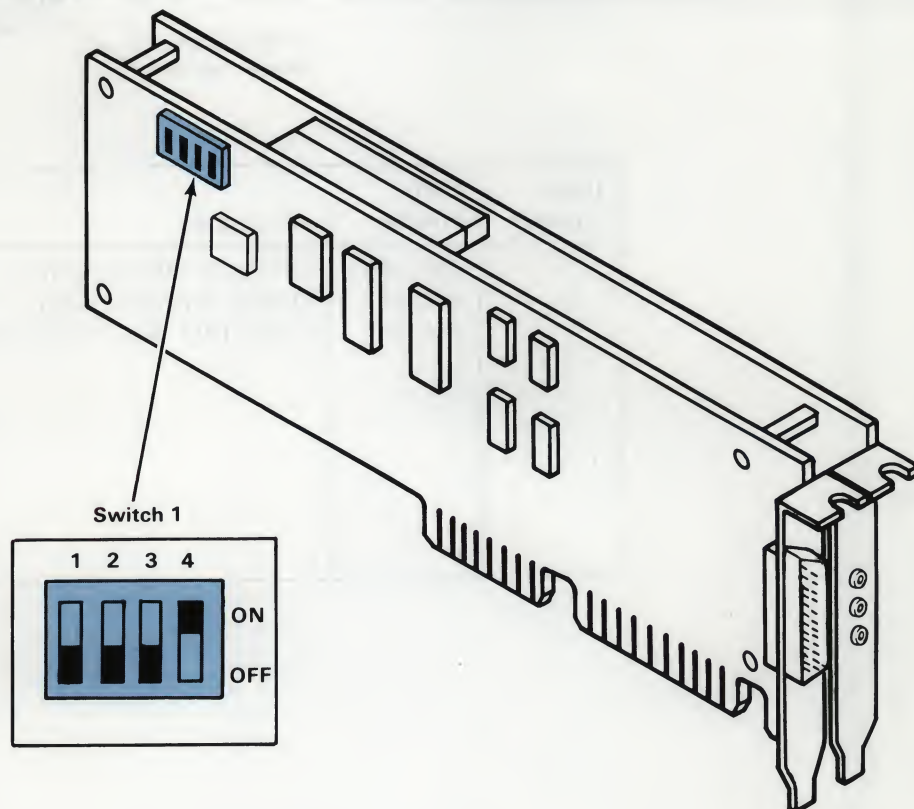
- | 1. Align the display processor board connector with the connector on  
| the display controller board and press into position.
- | 2. Install the four screws to fasten the boards together.
- | 3. Use the switch settings you recorded, set the switches.
- | 4. Use the Adapter Replacement Procedure in Section 4 to install the  
| adapter.



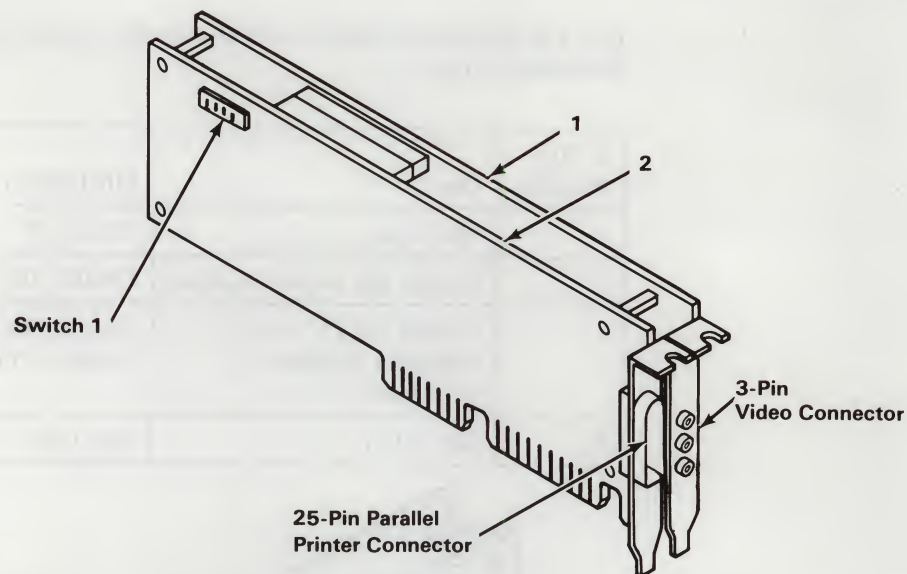
## Switch Settings

Use the following table to set the switch positions on the display processor board.

Switch Position	On	Off (Open)
1	Not used	Set to Off
2	Enable the printer adapter	Disable the printer adapter
3	Enable the PC Color Graphics Adapter emulation	Disable the PC Color Graphics Adapter emulation
4	Set to On	Not used



## Parts Information



Index Number	Part Number	Description
1	6247666	Display controller board
2	6247662	Display processor board
	6247661	Cable, IBM 5081 attachment

---

## RT PC 4-Port Asynchronous RS-232C Adapter (Buffered)

The RT PC 4-Port Asynchronous RS-232C Adapter (Buffered) contains four asynchronous adapters. The RT PC 4-Port Asynchronous RS-232C Adapter uses the I/O channel to communicate with the 32-bit processor or coprocessor.

### Specifications

Slot positions	IBM 6150, slots 2, 4, 5, 7, 8 IBM 6151, slots 2 - 5
I/O addresses	Address range 1, 1230 - 124F Address range 2, 2230 - 224F Address range 3, 3230 - 324F Address range 4, 4230 - 424F
Interrupt levels	9, 10, 11 (All shared, but see the notes for the RT PC Small Computer Systems Interface Adapter before using level 11 shared.)
Bit rates	50 - 19200 (set by program)
Bits per character	5, 6, 7, 8 (set by program)
Maximum number	4

### Removal Procedure

Use the Adapter Removal Procedure in Section 4.

### Replacement Procedure

Use the Adapter Replacement Procedure in Section 4.



## Switch Settings

Refer to the drawing on the next page to locate the switch banks, then use the charts below to set the switches on your adapter.

**Note:** Only one asynchronous adapter can use an address range. Each asynchronous adapter can be set to any of the four address ranges.

### Switch Bank 1 - Interrupt Level Selection

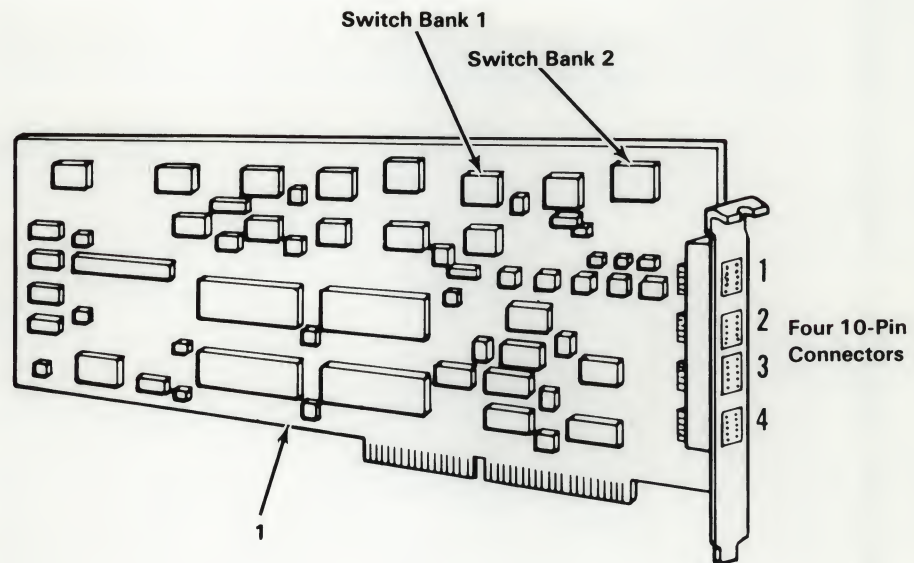
	9 Off On	10 Off On	11 Off On
Switch 1	X	X	X
Switch 2	X	X	X
Switch 3	X	X	X

### Switch Bank 2 - Address Range Selection

	1 Off On	2 Off On	3 Off On	4 Off On
Switch 1	X	X	X	X
Switch 2	X	X	X	X
Switch 3	X	X	X	X
Switch 4	X	X	X	X
Switch 5	X	X	X	X
Switch 6	X	X	X	X
Switch 7	X	X	X	X
Switch 8	X	X	X	X



## Parts Information



Index Number	Part Number	Description
1	61X6339 6298240 6298525 6298526 79X3914	4-Port Asynchronous RS-232C Adapter (Buffered) RT PC Modem Cable - RS-232C (10 Pin) RT PC Serial Printer Cable (10 Pin) RT PC ASCII Terminal Cable - RS-232C (10 Pin) RT PC ASCII Terminal Cable RS-232C (10/25M-Pin)



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## RT PC 4-Port Asynchronous RS-422A Adapter (Buffered)

The RT PC 4-Port Asynchronous RS-422A Adapter (Buffered) contains four asynchronous adapters. The RT PC 4-Port Asynchronous RS-422A Adapter uses the I/O channel to communicate with the 32-bit processor or coprocessor.

### Specifications

Slot positions	IBM 6150, slots 2, 4, 5, 7, 8 IBM 6151, slots 2 - 5
I/O addresses	Address range 1, 1230 - 124F Address range 2, 2230 - 224F Address range 3, 3230 - 324F Address range 4, 4230 - 424F
Interrupt levels	9, 10, 11 (All shared, but see the notes for the RT PC Small Computer Systems Interface Adapter before using level 11 shared.)
Bit rates	50 - 19200 (set by program)
Bits per character	5, 6, 7, 8 (set by program)
Maximum number	4

### Removal Procedure

Use the Adapter Removal Procedure in Section 4.

### Replacement Procedure

Use the Adapter Replacement Procedure in Section 4.



## Switch Settings

Refer to the drawing on the next page to locate the switch banks, then use the charts below to set the switches on your adapter.

**Note:** Only one asynchronous adapter can use an address range. Each asynchronous adapter can be set to any of the four address ranges.

### Switch Bank 1 - Interrupt Level Selection

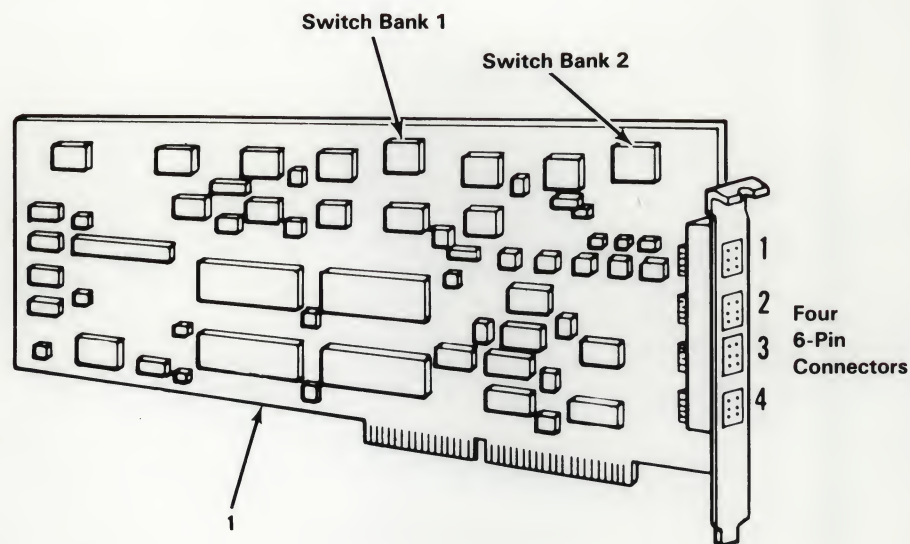
	9 Off On	10 Off On	11 Off On
Switch 1	X	X	X
Switch 2	X	X	X
Switch 3	X	X	X

### Switch Bank 2 - Address Range Selection

	1 Off On	2 Off On	3 Off On	4 Off On
Switch 1	X	X	X	X
Switch 2	X	X	X	X
Switch 3	X	X	X	X
Switch 4	X	X	X	X
Switch 5	X	X	X	X
Switch 6	X	X	X	X
Switch 7	X	X	X	X
Switch 8	X	X	X	X



## Parts Information



Index Number	Part Number	Description
1	79X3782 6298246 6487640	4-Port Asynchronous RS-422A Adapter (Buffered) RT PC ASCII Terminal Cable - RS-422A (6 pin), 20 m RT PC ASCII Terminal Cable - RS-422A (6 pin), 3 m

Continued



Description	Quantity	Unit
1. Piston and Ring Assembly	1	Set
2. Piston Pin	1	Pin
3. Piston Pin Retainer	2	Washers
4. Piston Pin Retainer	2	Washers

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## IBM AT Serial/Parallel Adapter

The IBM AT Serial/Parallel Adapter provides adapters for a serial port and a parallel printer. This adapter uses the I/O channel to communicate with the 32-bit processor and coprocessor.

### Specifications

Slot positions	1 - 5
Serial addresses	Primary adapter, 03F8-03FF Alternate adapter, 02F8-02FF
Parallel addresses	Primary adapter, 0378-037F Alternate adapter, 0278-027F
Interrupt levels	Primary serial, 4 Primary parallel, 7 Alternate serial, 3 Alternate parallel, 5
Bit rates	50 - 19200
Bits per character	5, 6, 7, 8
Maximum number	2

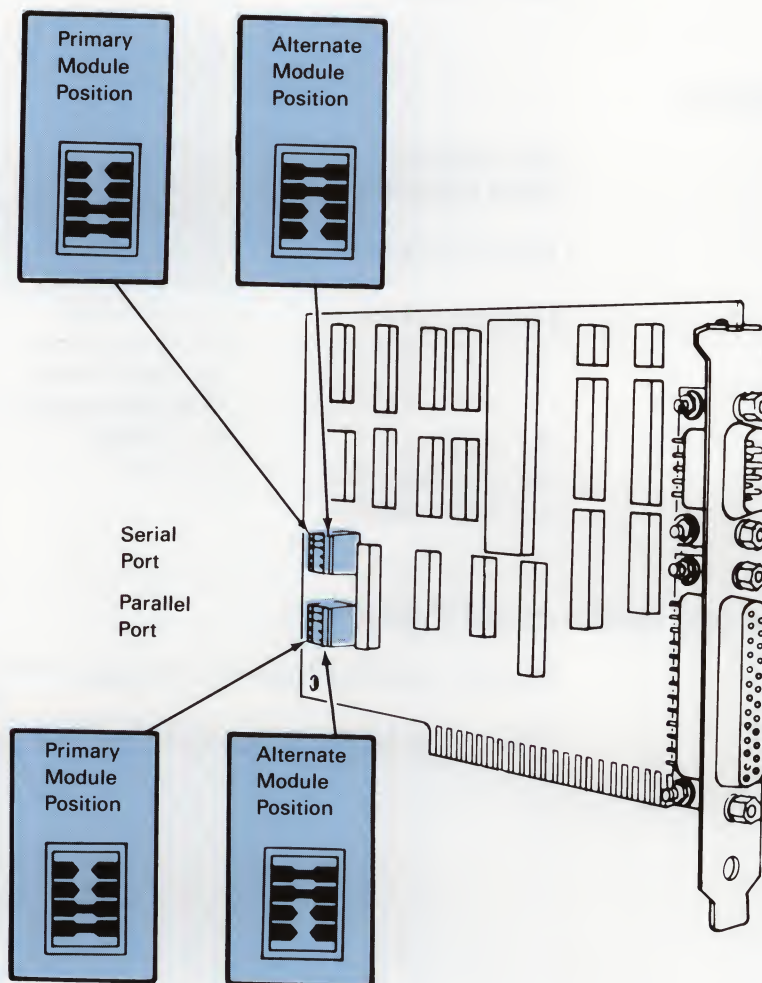
### Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal.

Use the "Adapter Replacement" on page 4-20 procedure for replacement.

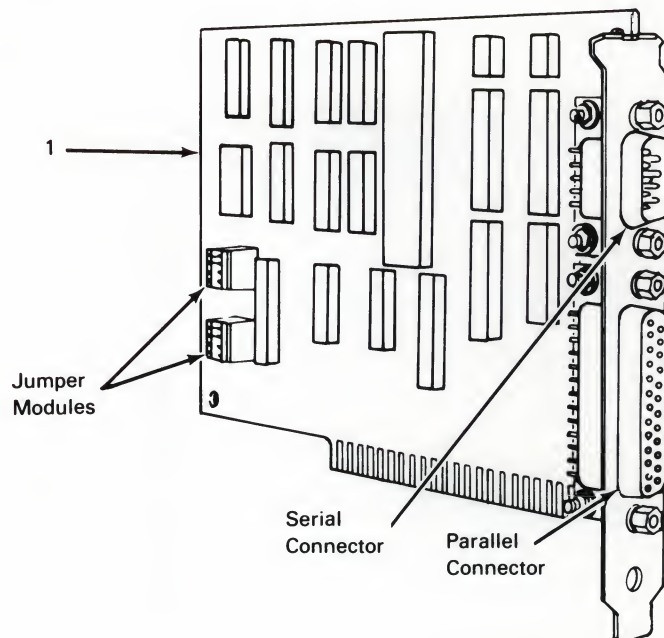
## Jumper Module Settings

Use the diagram below to set the jumper modules on your adapter.





## Parts Information



Index Number	Part Number	Description
1	8286147 8286194 6298963 8286170 8529214 6848247	IBM AT Serial/Parallel Adapter IBM AT Serial Adapter Connector (10 inch) RT PC Serial Printer Cable (9 Pin) IBM AT Modem Cable - RS232C/9 Pin IBM PC Parallel Printer Cable RT PC ASCII Terminal Cable - RS232 (9-pin)



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## IBM PC Network Adapter

The IBM PC Network Adapter attaches the IBM 6151 System Unit to the IBM PC Network. The IBM PC Network Adapter uses the I/O channel to communicate with the 32-bit processor and coprocessor.

### Specifications

Slot positions	1 - 5
I/O addresses	Primary, 0360 - 0367 Alternate, 0368 - 036F
Memory addresses	0CC000 - 0CDFFF
DMA channel	3
Interrupt levels	3, 9
Maximum number	1

### Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal.

Use the "Adapter Replacement" on page 4-20 procedure for replacement.

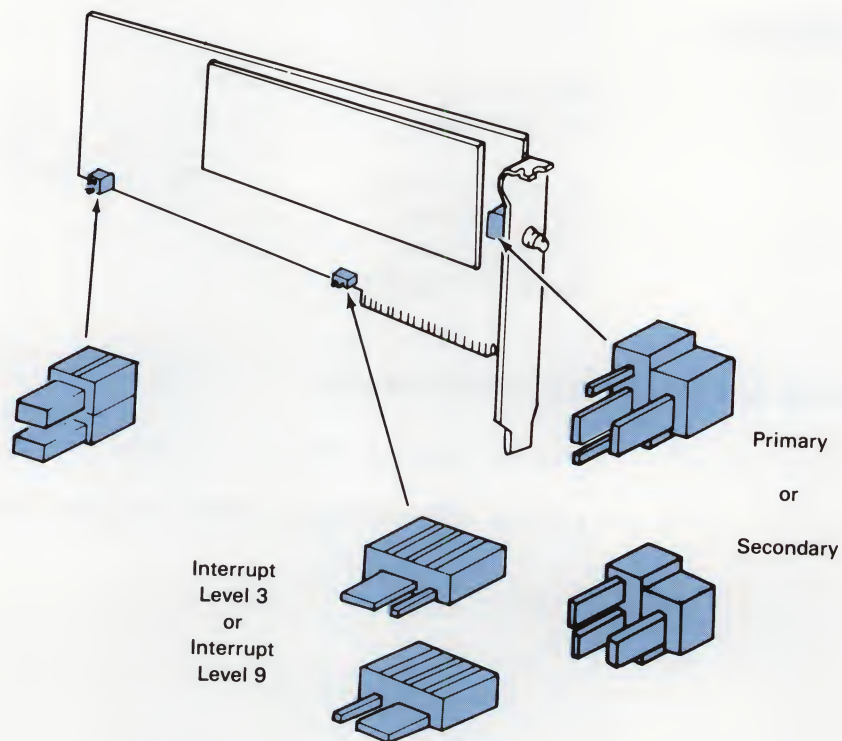
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## Jumper Settings

Set the jumpers to select Primary or Alternate addresses.

Set the jumper to select Interrupt Level 3 or Interrupt Level 9.

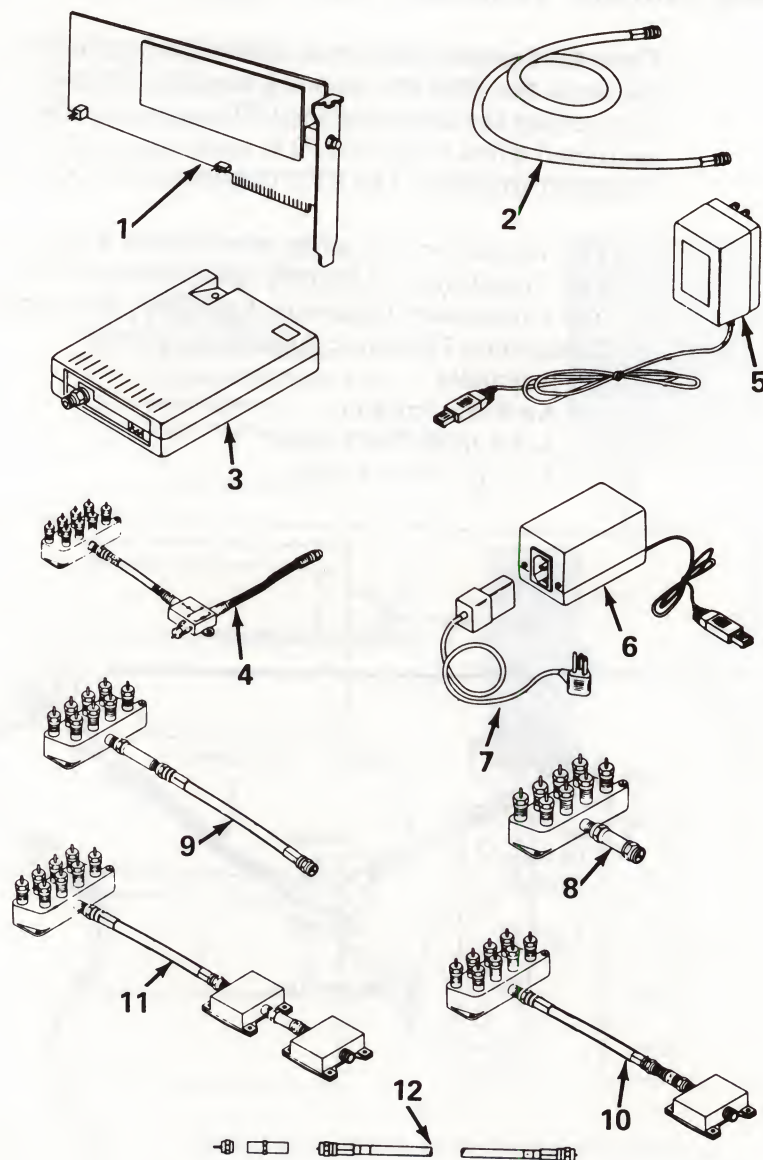
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## Parts Information



Index Number	Part Number	Description
1	8286171	PC Network Adapter
2	8286172	PC Network Adapter Cable
3	8286173	Translator Assembly
4	8286174	Connection Hardware Assembly
	8286175	Spare parts kit -Kit consists of: a 7/16 and 9/16 inch wrench, 30Dd attenuator, labels - A, label kit assembly
5	8286176	Transformer Assembly, 120 V ac
6	8286177	Transformer Assembly, 230 V ac
7		Power cable, see Section 5
8	8286178	Base Expander
9	8286179	Short Distance Kit
10	8286180	Medium Distance Kit
11	8286181	Long Distance Kit
12	8286182	Cable, 7.62m (25 feet)
12	8286183	Cable, 15.24m (50 feet)
12	8286184	Cable, 30.48m (100 feet)
12	8286185	Cable, 60.96m (200 feet)





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## RT PC Multiprotocol Adapter

The RT PC Multiprotocol Adapter provides hardware to attach various communications devices to the IBM 6151 System Unit. The RT PC Multiprotocol Adapter uses the I/O bus to communicate with the 32-bit processor and coprocessor.

### Specifications

Slot position	2 - 5
I/O addresses	Primary, 0510 - 052F Alternate, 0910 - 092F
DMA channel	Primary, 1 Alternate, 5
Interrupt levels	10, 11 (shared)
Maximum number	2

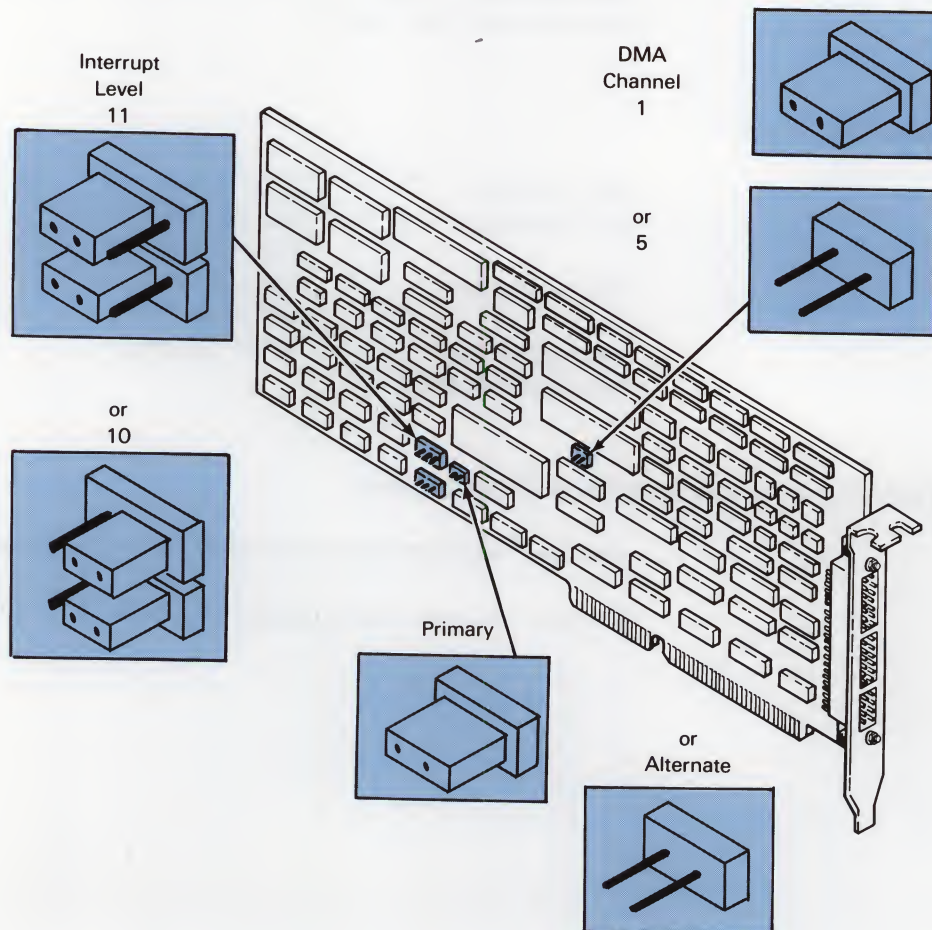
### Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal.

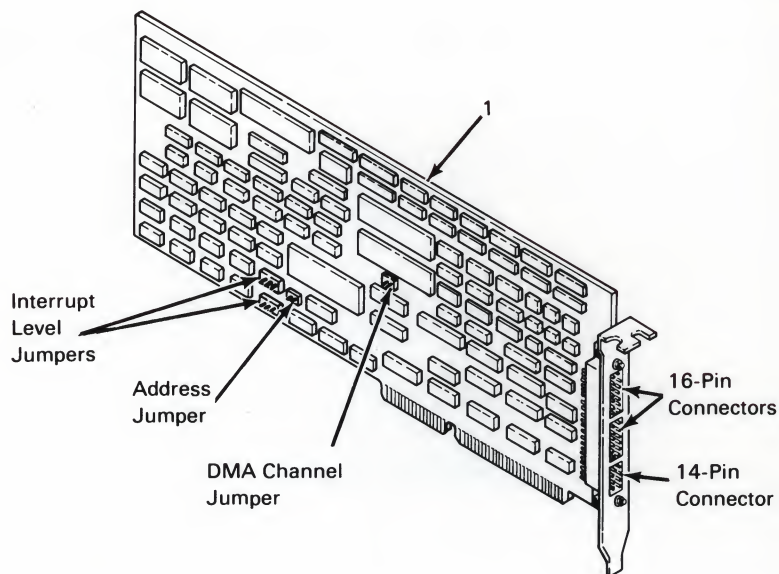
Use the "Adapter Replacement" on page 4-20 procedure for replacement.

## Jumper Settings

Use the diagram below to set the jumpers on the adapter.



## Parts Information



Index Number	Part Number	Description
1	6299350 6294813 6294815 6294817	RT PC Multiprotocol Adapter RT PC Multiprotocol Adapter RS-232C cable RT PC Multiprotocol Adapter RS-366 cable RT PC Multiprotocol Adapter X.21 cable





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## RT PC Baseband Adapter

The RT PC Baseband Adapter provides the hardware to attach the IBM 6151 System Unit to an Ethernet Network. The RT PC Baseband Adapter uses the I/O channel to communicate with the 32-bit processor and coprocessor.

### Specifications

Slot positions	1 - 4
Memory addresses	080000 - 0F8000 (any 32K-byte block)
Interrupt levels	3, 4, 5, 7, 9
Maximum number	2

### Removal and Replacement Procedures

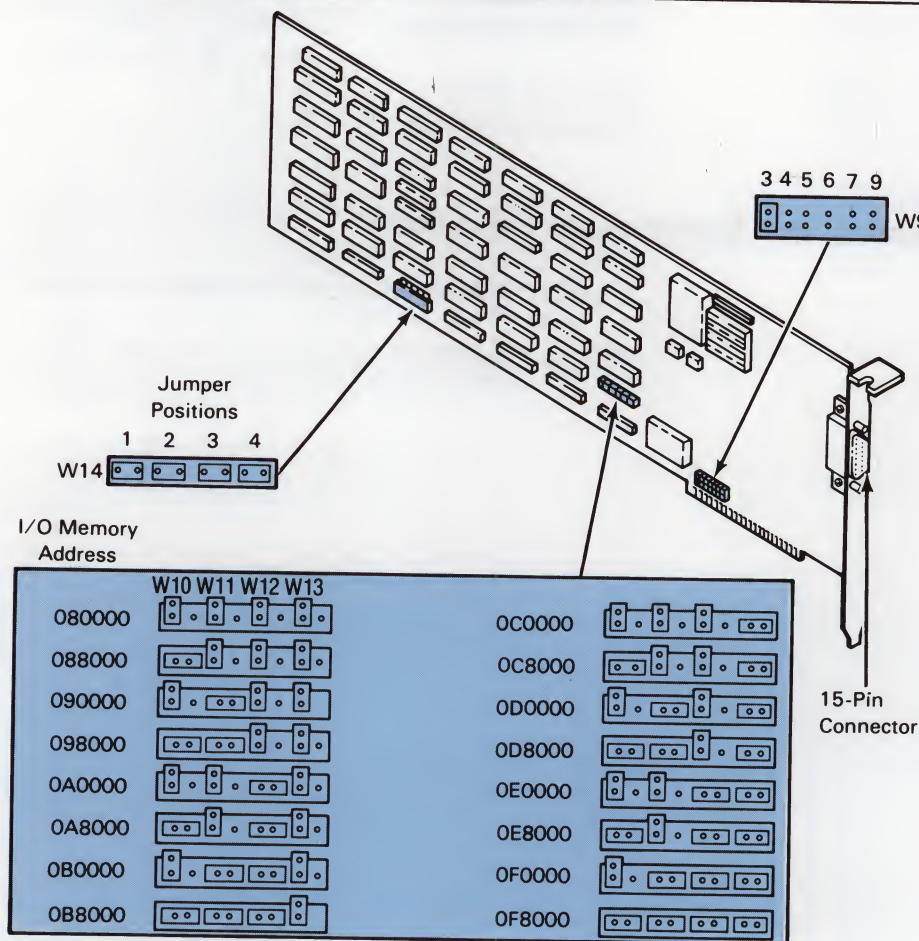
Use the "Adapter Removal" on page 4-18 procedure for removal.

Use the "Adapter Replacement" on page 4-20 procedure for replacement.

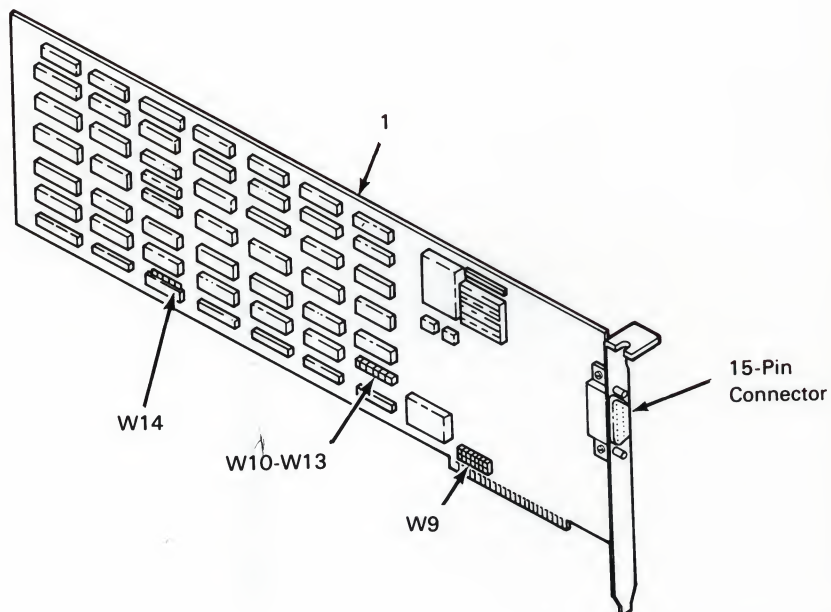
## Jumper Settings

Set the jumpers as follows:

- W9** Set to the interrupt level desired.  
**W10 - W13** Set for the 32K-byte block of memory desired.  
**W14** Sets the interrupt request rate:  
**Position 1** Interrupts every 9.1 ms  
**Position 2** Interrupts every 18.3 ms  
**Position 3** Interrupts every 36.6 ms  
**Position 4** Interrupts every 73.2 ms.



## Parts Information



Index Number	Part Number	Description
1	61X6809	RT PC Baseband Adapter





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## IBM PC 3278/79 Emulation Adapter

The IBM PC 3278/79 Emulation Adapter provides the hardware to make the IBM 6150 System Unit respond to a host system like an IBM 3278 or IBM 3279 Display Terminal.

There are two styles of IBM PC 3278/79 Emulation Adapters in use. The long adapter is the earlier design and has no jumper or switch settings. The short adapter has switch settings. When ordering a replacement adapter, order the short adapter.

**Note:** The long and short adapters *cannot* be in the same system unit.

### Specifications

Slot positions	IBM 6150, Slots 2 – 8 IBM 6151, Slots 1 – 5
I/O addresses	Address range 1, 02D0 – 02DA Address range 2, 06D0 – 06DA Address range 3, 0AD0 – 0ADA Address range 4, 0ED0 – 0EDA
Memory addresses	0CE000 – 0CFFFF
Interrupt level	9
Maximum number	4

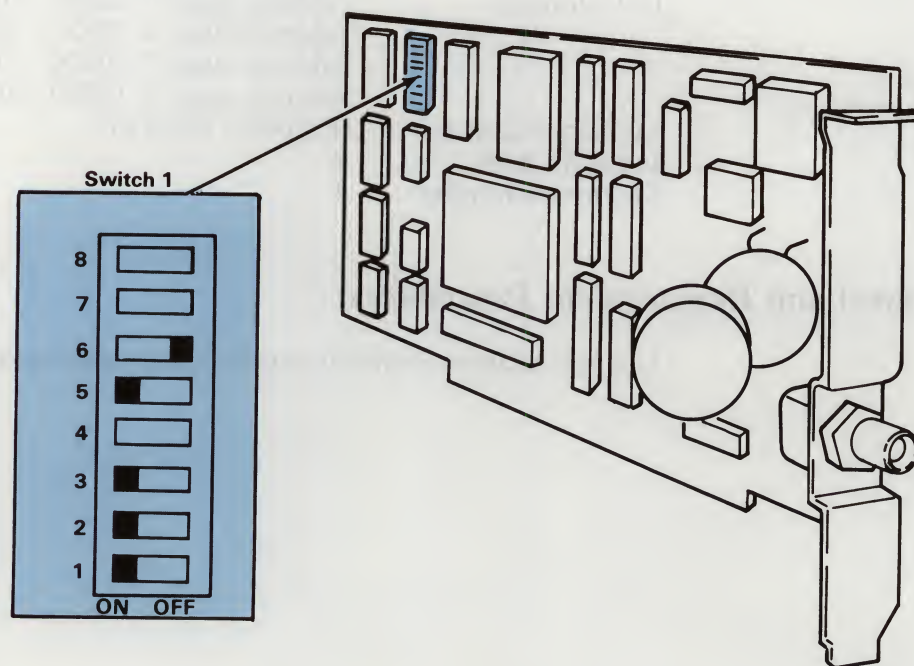
### Removal and Replacement Procedures

Use the Adapter Removal and Replacement procedures in Section 4.

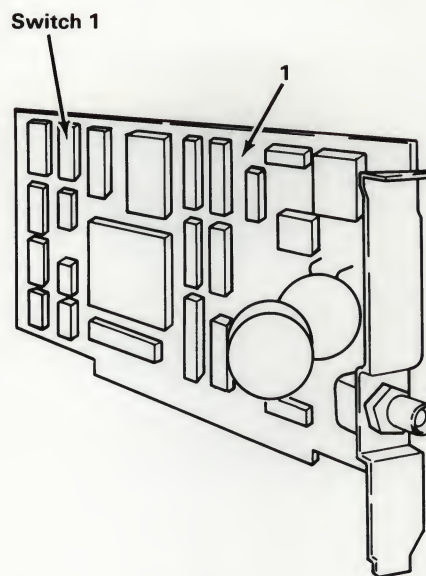
## Switch Settings

**Note:** Only one adapter can use an address range.

Position	Description
1 and 2	Address range 1, 1 On, 2 On Address range 2, 1 Off, 2 On Address range 3, 1 On, 2 Off Address range 4, 1 Off, 2 Off
3	Off, disable interrupts On, enable interrupts
4	Reserved
5	On, for address range 1 Off, for address ranges 2 - 4
6	Off, slots 1 - 7 on PCXT and all RT PC slots On, slot 8 on PCXT
7 and 8	Reserved



## Parts Information



Index Number	Part Number	Description
1	8665792	IBM PC 3278/79 Emulation Adapter (short adapter). Use this adapter to replace the long adapter also.

FIGURE 10-10



TABLE 10-1 TYPICAL PERFORMANCE DATA	Type	Capacity
The following table lists the typical performance data for the various models of the TNL SN20-9850 series. The data is based on a standard test procedure and is intended for informational purposes only. Actual performance may vary due to a number of factors, including ambient conditions, load, and wear.	Model	Capacity



## IBM Token-Ring Network RT PC Adapter

The IBM Token-Ring Network Adapter provides the hardware to attach the IBM RT PC System Units to the IBM Token-Ring Network. This adapter uses the I/O channel to communicate with the 32-bit processor. Two types of the IBM Token-Ring Network RT PC Adapter are in use. The early version allows the selection of two address ranges, while the later version allows for four address ranges. Use the switch settings for your version.

### Specifications

Slot positions	IBM 6150, slots 2, 4, 5, 7, (also slot 8 with address ranges 1, 2, 4) IBM 6151, slots 2, 3, 4, (also slot 5 with address ranges 1, 2, 4)
I/O addresses	Address range 1, 01C0 - 01CF (Early Version, primary) Address range 2, 0140 - 014F (Early Version, alternate) Address range 3, 11C0 - 11CF Address range 4, 11D0 - 11DF
DMA channel	Address range 1, 5 (Early Version, primary) Address range 2, 6 (Early Version, alternate) Address range 3, 7 Address range 4, 3
Interrupt level	11, 12 (both shared), (Early Version, 12 shared)
Maximum number	4 (Early Version, 2)

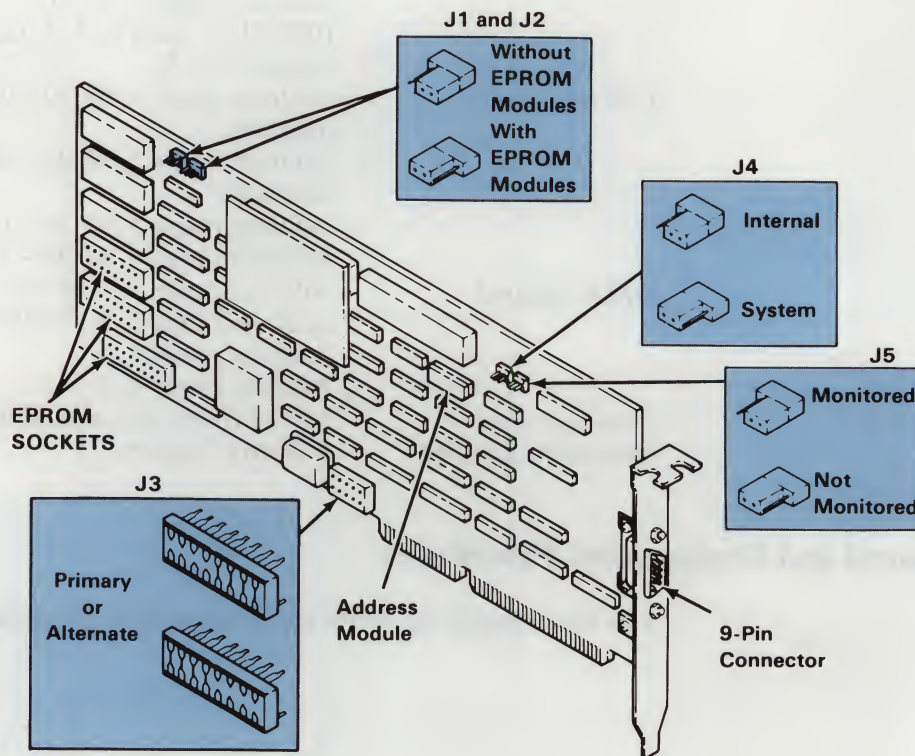
### Removal and Replacement Procedures

Use the Adapter Removal and Replacement procedures in Section 4.

## Jumper Settings (Early Version)

Set the jumpers as follows:

- J1 and J2** Set after looking at the EPROM sockets.
- J3** Set for Primary or Alternate adapter.
- J4** Internal — the adapter address is provided by the Address Module.  
System — the adapter address is provided by the system.
- J5** Monitored — the Processor Activity Timer is active.  
Not Monitored — the Processor Activity Timer is not active.

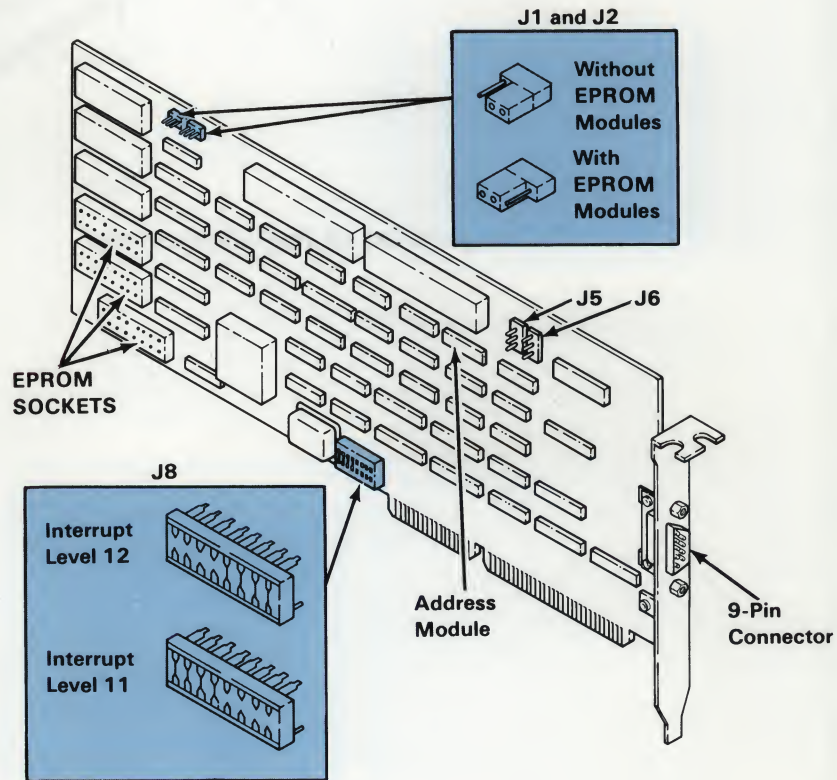




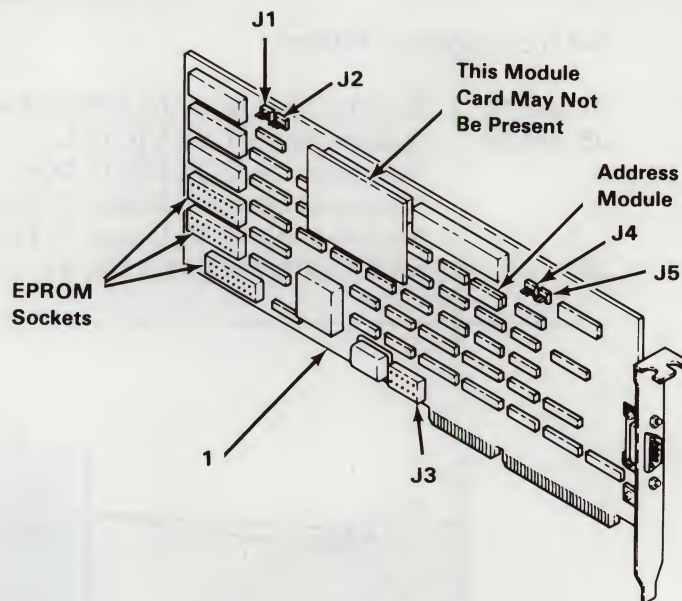
## Jumper Settings (Later Version)

Set the jumpers as follows:

- |                  |   |
|------------------|---|
| <b>J1 and J2</b> | Set after looking at the EPROM sockets. |
| <b>J5 and J6</b> | Address range 1, J5 Up, J6 Up           |
|                  | Address range 2, J5 Up, J6 Down         |
|                  | Address range 3, J5 Down, J6 Up         |
|                  | Address range 4, J5 Down, J6 Down       |
| <b>J8</b>        | Set for interrupt level 11 or 12        |

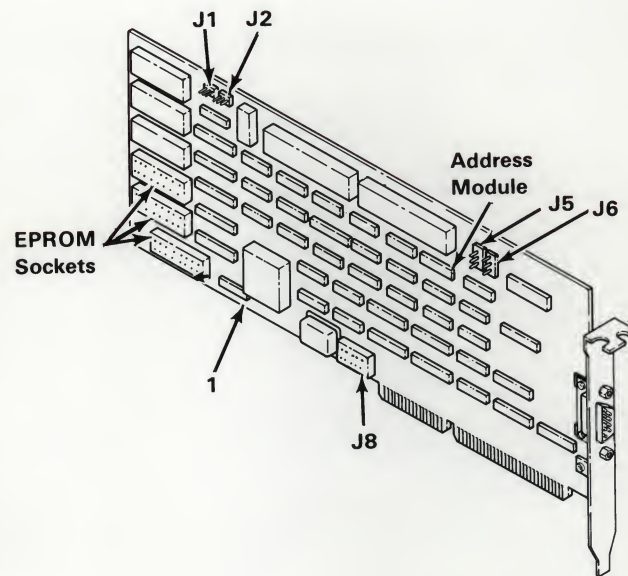


## Parts Information (Early Version)



Use the parts list on the following page.



**Parts Information (Later Version)**

Index Number	Part Number	Description
1	69X8142	IBM Token-Ring Network RT PC Adapter (Order to replace both early and later adapters)
	6339098	IBM Token-Ring Network RT PC Adapter Cable

Figure 1-1. (Continued)



TABLE 1-1. (Continued)	
1. (Continued)	2. (Continued)
3. (Continued)	4. (Continued)
5. (Continued)	6. (Continued)
7. (Continued)	8. (Continued)
9. (Continued)	10. (Continued)
11. (Continued)	12. (Continued)
13. (Continued)	14. (Continued)
15. (Continued)	16. (Continued)
17. (Continued)	18. (Continued)
19. (Continued)	20. (Continued)
21. (Continued)	22. (Continued)
23. (Continued)	24. (Continued)
25. (Continued)	26. (Continued)
27. (Continued)	28. (Continued)
29. (Continued)	30. (Continued)
31. (Continued)	32. (Continued)
33. (Continued)	34. (Continued)
35. (Continued)	36. (Continued)
37. (Continued)	38. (Continued)
39. (Continued)	40. (Continued)
41. (Continued)	42. (Continued)
43. (Continued)	44. (Continued)
45. (Continued)	46. (Continued)
47. (Continued)	48. (Continued)
49. (Continued)	50. (Continued)
51. (Continued)	52. (Continued)
53. (Continued)	54. (Continued)
55. (Continued)	56. (Continued)
57. (Continued)	58. (Continued)
59. (Continued)	60. (Continued)
61. (Continued)	62. (Continued)
63. (Continued)	64. (Continued)
65. (Continued)	66. (Continued)
67. (Continued)	68. (Continued)
69. (Continued)	70. (Continued)
71. (Continued)	72. (Continued)
73. (Continued)	74. (Continued)
75. (Continued)	76. (Continued)
77. (Continued)	78. (Continued)
79. (Continued)	80. (Continued)
81. (Continued)	82. (Continued)
83. (Continued)	84. (Continued)
85. (Continued)	86. (Continued)
87. (Continued)	88. (Continued)
89. (Continued)	90. (Continued)
91. (Continued)	92. (Continued)
93. (Continued)	94. (Continued)
95. (Continued)	96. (Continued)
97. (Continued)	98. (Continued)
99. (Continued)	100. (Continued)

## RT PC Small Computer Systems Interface Adapter

### Notes:

1. The RT PC Small Computer Systems Interface Adapter is abbreviated as RT PC SCSI Adapter in this publication.
2. The RT PC SCSI Adapter should not share interrupt level 11 with either of the 4-port asynchronous adapters.

The RT PC SCSI Adapter provides for the attachment of devices that use the Small Computer System Interface (SCSI) bus to the IBM 6150 and 6151 System Units. The RT PC SCSI Adapter uses the I/O channel to communicate with the 32-bit processor and coprocessor.

### Specifications

Slot positions	IBM 6150, slots 2, 4, 5, 7 (also slot 8 except with DMA channel 7) IBM 6151, slots 2, 3, 4 (also slot 5 except with DMA channel 7)
I/O addresses	Primary, 0D50 - 0D5F Secondary, 0950 - 095F
DMA Channels	0,1,3,5,6,7 (program controlled)
Interrupt level	11, 12 (both shared, see note 2 above)
Maximum number	2

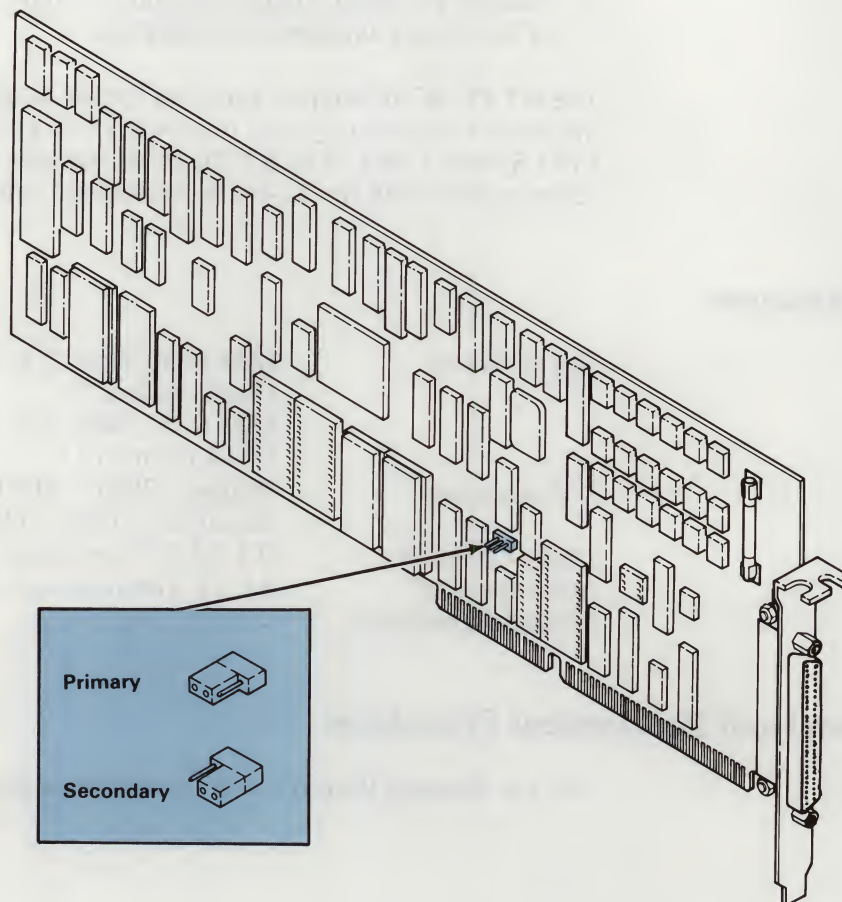
### Removal and Replacement Procedures

Use the Adapter Removal and Replacement procedures in Section 4.

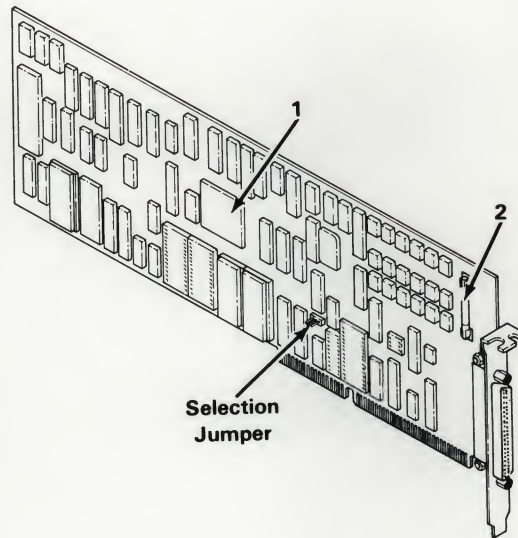


## Jumper Settings

Set the jumper for **Primary** or **Secondary** as shown below.





**Parts Information**

Index Number	Part Number	Description
1	61X7001	RT PC SCSI Adapter
2	0855253	Fuse, 1.0A 250V
	79X3467	RT PC SCSI Adapter Cable
	79X3469	RT PC SCSI Device-to-Device Cable
	79X3795	Terminator



---

## RT PC Streaming Tape Drive Adapter

The RT PC Streaming Tape Drive Adapter attaches the IBM 6157 Streaming Tape Drive to the IBM 6151 System Unit. The Streaming Tape Drive Adapter uses the I/O channel to communicate with the 32-bit processor and coprocessor.

### Specifications

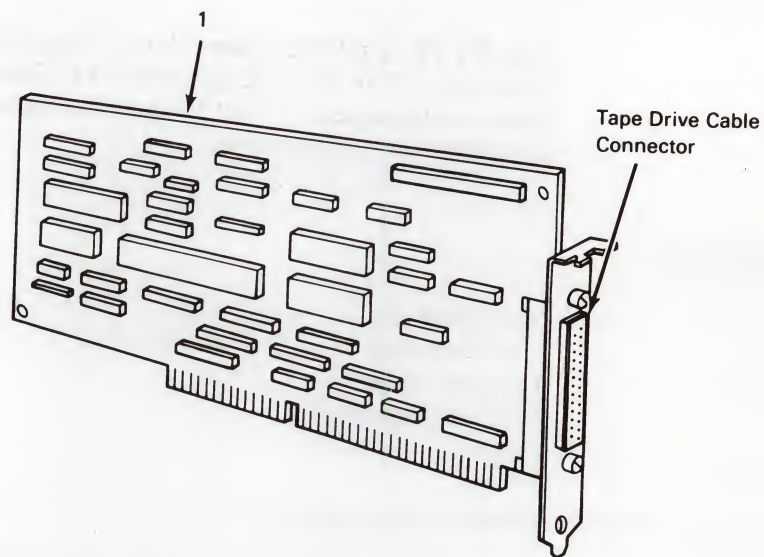
Slot positions	2 - 5
I/O addresses	01E8 - 01EF
Interrupt level	12
Maximum number	1

### Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal.

Use the "Adapter Replacement" on page 4-20 procedure for replacement.

## Parts Information



Index Number	Part Number	Description
1	6299222	RT PC Streaming Tape Drive Adapter



---

## RT PC 5080 Peripheral Adapter

The RT PC 5080 Peripheral Adapter provides the hardware to connect the IBM 5085 Dials Feature and the IBM 5085 Lighted Program Function Keyboard Feature to the IBM 6151 System Unit. The RT PC 5080 Peripheral Adapter uses the I/O channel to communicate with the 32-bit processor or coprocessor.

### Specifications

Slot positions	2 - 5
I/O addresses	4230 - 424F
Interrupt levels	11 (shared)
Maximum number	1

### Removal and Replacement Procedures

Use the "Adapter Removal" on page 4-18 procedure for removal.

Use the "Adapter Replacement" on page 4-20 procedure for replacement.

## Switch Settings

Use the drawing on the next page to locate the switch banks, then set the interrupt level and the address switches as shown.

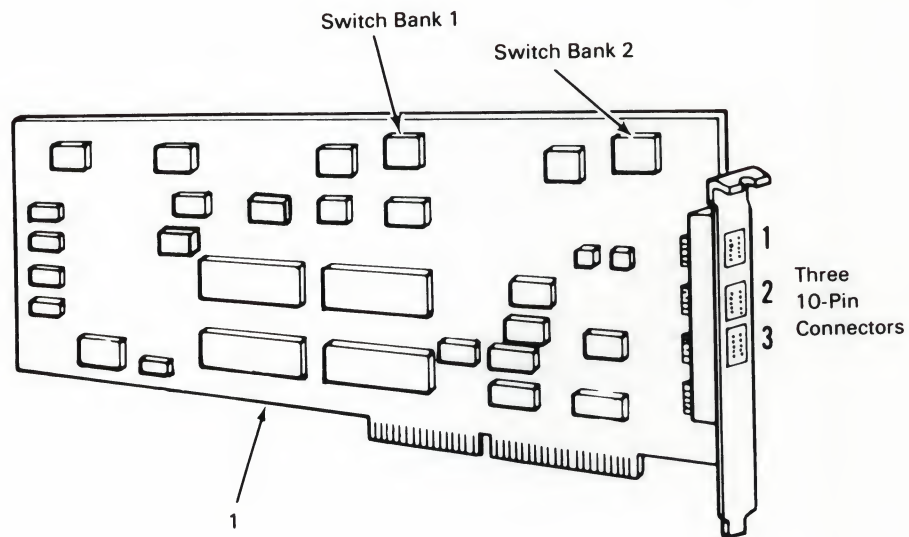
### Switch Bank 1 - Interrupt Level Selection

	11 Off On
Switch 1	X
Switch 2	X
Switch 3	X

### Switch Bank 2 - Address Range Selection

	4 Off On
Switch 1	X
Switch 2	X
Switch 3	X
Switch 4	X
Switch 5	X
Switch 6	X
Switch 7	X
Switch 8	X

## Parts Information



Index Number	Part Number	Description
1	6487562 6487563	RT PC 5080 Peripheral Adapter RT PC 5080 Peripheral Adapter Cable





## | RT PC S/370 Host Interface Adapter

| The RT PC S/370 Host Interface Adapter is used to connect the IBM 6150 System Unit to the IBM 5088 Graphics Controller.

| The RT PC S/370 Attachment Adapter provides the hardware to allow the IBM RT PC System to transfer information to and from the IBM 5088 and then to the host system.

## | Specifications

Slot positions	IBM 6150 – 2, 4, 5, 7, 8 IBM 6151 – 2, 3, 4, 5
I/O addresses	0E20 – 0E2F
Memory addresses	EA0000 – EBFFFF
DMA channel	5
Interrupt level	10
Bit rate	1M or 2M bits per second (Set by program)
Maximum number	1

## **| Removal Procedure**

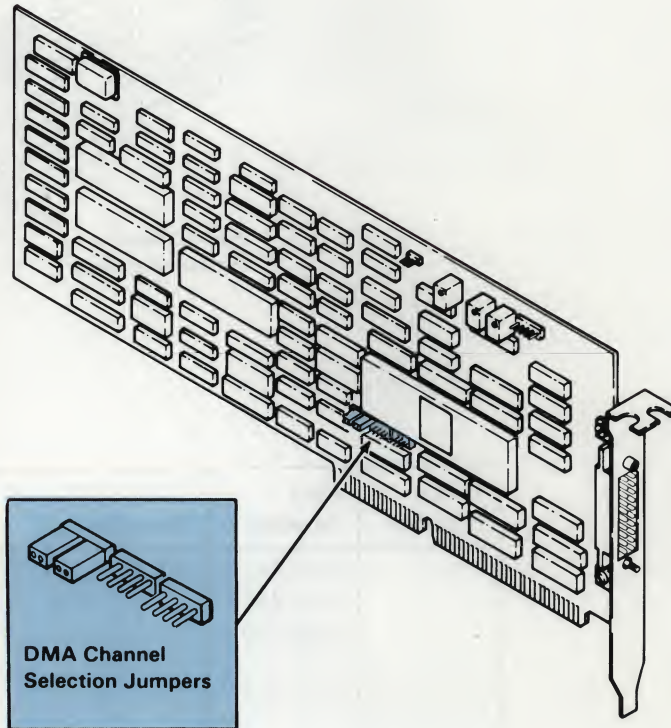
- |** 1. Be sure all communications on this link is stopped before proceeding.  
**|** If needed, get assistance.
- |** 2. Use the Adapter Removal Procedure in Section 4 to remove the  
**|** adapter.

## **| Replacement Procedure**

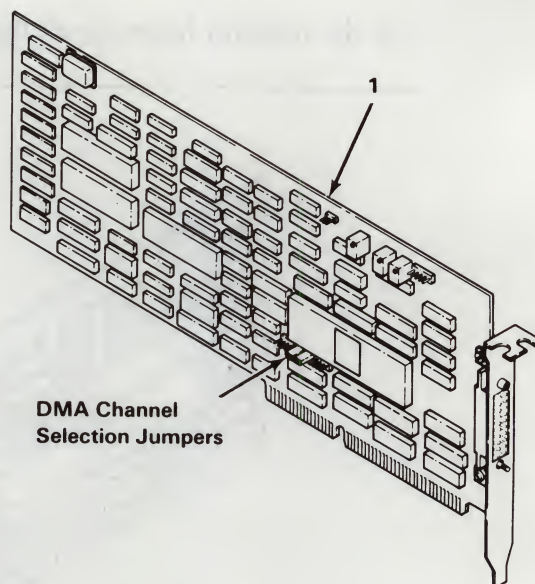
**|** Use the Adapter Replacement Procedure in Section 4 to install the  
**|** adapter.

## Jumper Settings

Use the diagram below to set the DMA channel selection jumpers.



## Parts Information



Index Number	Part Number	Description
1	6247891 6247861 6246330	RT PC S/370 Host Interface Adapter RT PC 5080 Attachment Adapter Cable Kit Terminator, serial interface



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## **Section 10. User Input Devices**

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## About this Section

This section contains information about the user input devices. Use the contents list on the preceding page to find information about your input device.

Pages in this section contain a 3-digit product code in the page number to make future updating easier.





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## Keyboard

The keyboard connects to the rear of the system unit. The keyboard also contains the system speaker.

The Keyboard is a single field-replaceable unit and cannot be serviced in the field.

## Specifications

Number of keys	U.S., 101 WT, 102
Connector	6-Pin keyed
Power	From the system unit

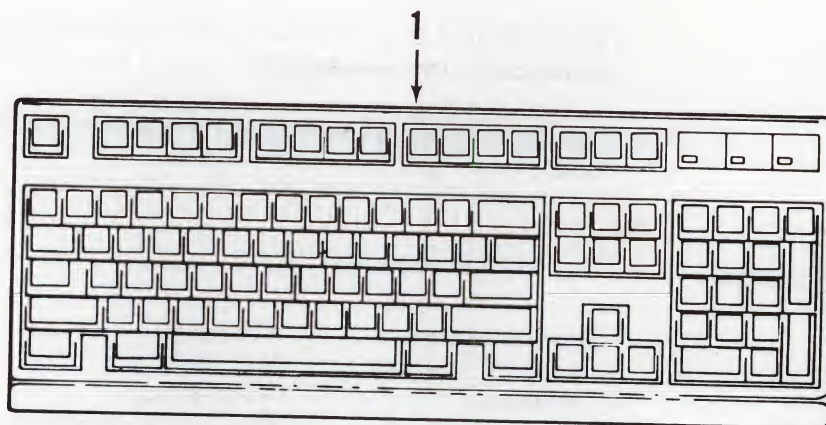
## Removal Procedure

1. Do the "Rear Cover Removal" on page 4-10.
2. Pull the keyboard cable connector out from the keyboard connector on the system unit.

## Replacement Procedure

1. Push the keyboard cable connector into the keyboard connector on the system unit.
2. Do the "Rear Cover Replacement" on page 4-11.

## Parts Information



Index Number	Part Number	Description
1	6299238	Keyboard, United States English
1	6299315	Keyboard, United Kingdom English
1	6299316	Keyboard, French
1	6299317	Keyboard, German
1	6299318	Keyboard, Spanish
1	6299319	Keyboard, Italian
1	6487676	Keyboard, Portuguese
1	6487677	Keyboard, Danish
1	6487678	Keyboard, Norwegian
1	6487679	Keyboard, Finnish/Swedish
1	6487680	Keyboard, Belgian-French/Dutch
1	6487681	Keyboard, Swiss German/French
1	6487682	Keyboard, Canadian-French

---

## Mouse

The Mouse is a locator device used to control the system. The function controlled by the Mouse is determined by the program.

The Mouse is a single field-replaceable unit.

See the *IBM RT PC Guide to Operations* for the cleaning procedure.

## Specifications

Number of buttons	2
Connector	6-Pin keyed
Power	From the system unit

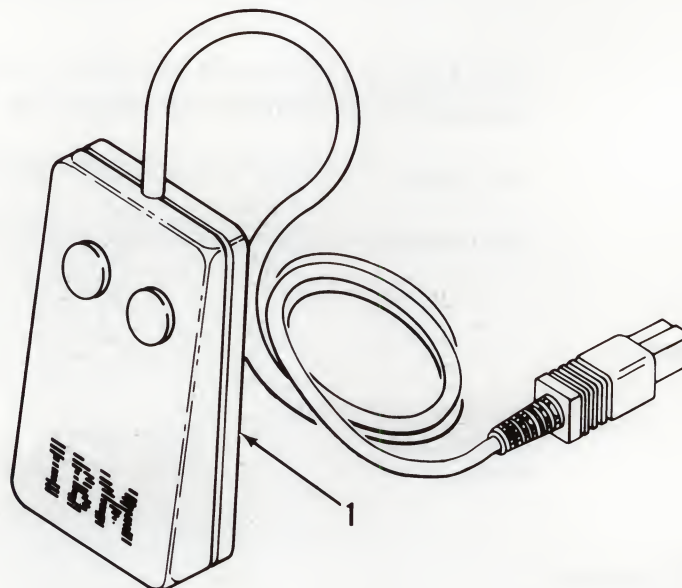
## Removal Procedure

1. Do the "Rear Cover Removal" on page 4-10.
2. Pull the mouse cable connector out from the mouse connector on the system unit.

## Replacement Procedure

1. Push the mouse cable connector into the mouse connector on the system unit.
2. Do the "Rear Cover Replacement" on page 4-11.

## Parts Information



Index Number	Part Number	Description
1	6299239	Mouse



---

## IBM 5083 Tablet

The IBM 5083 Tablet is a thin flat-surfaced unit used to input pointing instructions to the system. Either the *Cursor* or the *Stylus* attaches to the Tablet.

The Cursor is a mouse-like device with four buttons. The Stylus is a pen-like device. When the Cursor or the Stylus is moved on the surface of the Tablet, the Tablet provides their location to the software. When the buttons on the Cursor are pressed, or when the Stylus is pressed, the Tablet provides an identifying code to the software.

On models 1, 11, and 12 of the IBM 5083 Tablet, the RT PC 5083 Tablet Cable Kit is required to attach the IBM 5083 Tablet to the IBM 6150 or IBM 6151 System Unit. The cable from the RT PC 5083 Tablet Cable Kit attaches the IBM 5083 to the M connector on the rear of the system unit. The RT PC 5083 Tablet Cable Kit also includes a clamping device that encloses the connectors.

On models 11A and 12A of the IBM 5083 Tablet, a single cable attaches the tablet to the M connector on the IBM 6150 or IBM 6151 System Unit.

See the *IBM RT PC Guide to Operations* for the Tablet cleaning procedure.

## Specifications

Number of buttons	Cursor, 4
Power	From the adapter
Adapter	RT PC 5080 Peripheral Adapter

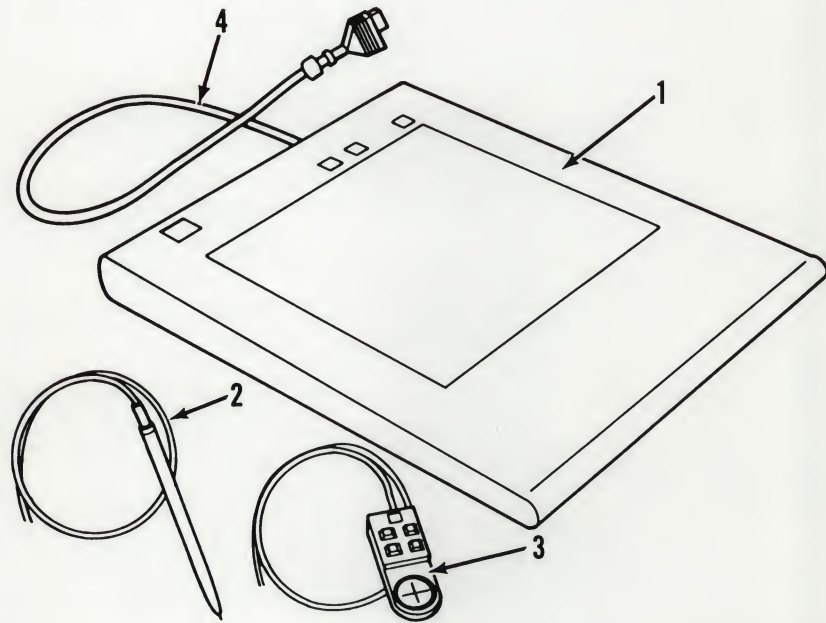
## Removal Procedure

1. Set the power switch on the system unit to Off.
2. Do the Rear Cover Removal procedure.
3. Disconnect the cable from the M connector on the rear of the system unit.
4. If present, remove the clamping device and disconnect the IBM 5083 Tablet cable.
5. Disconnect the Stylus or Cursor from the front of the IBM 5083.

## Replacement Procedure

1. Connect the Cursor or Stylus into the connector on the front of the IBM 5083.
2. If present, connect the IBM 5083 cable connector to the cable included in the Tablet Cable Kit and install the clamping device.
3. Connect that cable to the M connector on the rear of the system unit.
4. Do the Rear Cover Replacement procedure.
5. Set the power switch on the system unit to On.

## Parts Information



Index Number	Part Number	Description
1	6248426	IBM 5083 Model 1 Tablet
1	6248514	IBM 5083 Model 11 Tablet
1	6248513	IBM 5083 Model 12 Tablet
1	6248516	IBM 5083 Model 11A Tablet
1	6248515	IBM 5083 Model 12A Tablet
2	6248427	Stylus for the Model 1
2	6248522	Stylus for the Models 11, 11A, 12, 12A
3	6248428	Cursor for the Model 1
3	6248523	Cursor for the Models 11, 11A, 12, 12A
4	6487587	RT PC 5083 Tablet Cable Kit for Models 1, 11, 12
	6248524	Cable, IBM RT PC to IBM 5083, Models 11A and 12A



FIGURE 10-10



Part Name	Quantity	Notes
1. Motor Assembly	1	See Figure 10-10
2. Drive Shaft	1	See Figure 10-10
3. Coupling	1	See Figure 10-10
4. Pulley	1	See Figure 10-10
5. Belt	1	See Figure 10-10
6. Housing	1	See Figure 10-10
7. Gasket	1	See Figure 10-10
8. Bolt	4	See Figure 10-10
9. Nut	4	See Figure 10-10



---

## IBM 5085 Dials Feature

The IBM 5085 Dials Feature is a desktop unit with eight dials arranged in two rows of four dials. The Dials Feature is used to input analog positional information. The dials can turn completely around without any stops. The software uses the information provided by the Dials Feature.

The RT PC 5080 Peripheral Cable Kit is required to attach the Dials Feature to the IBM 6151 System Unit. The cable from the Peripheral Cable Kit attaches to the end of the Dials Feature cable. The Peripheral Cable Kit also includes a clamping device that encloses the connectors.

### Specifications

Number of dials	8
Power	From the adapter
Adapter	RT PC 5080 Peripheral Adapter

---

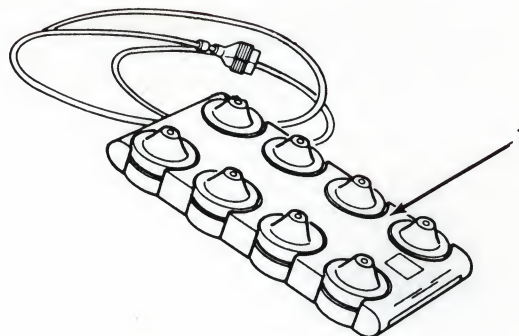
## **Removal Procedure**

1. Set the power switch on the system unit to Off.
2. Do the "Rear Cover Removal" on page 4-10.
3. Disconnect the cable to the IBM 5085 Dials Feature from the RT PC 5080 Peripheral Adapter.
4. Remove the clamping device and disconnect the Dials Feature cable.

## **Replacement Procedure**

1. Connect the Dials Feature cable connector to the cable from Peripheral Cable Kit and install the clamping device.
2. Connect the cable to the RT PC 5080 Peripheral Adapter.
3. Do the "Rear Cover Replacement" on page 4-11.
4. Set the power switch on the system unit to On.

## Parts Information



Index Number	Part Number	Description
1	6248436 6487563	IBM 5085 Dials Feature RT PC 5080 Peripheral Cable





---

## IBM 5085 Lighted Program Function Keyboard Feature

The IBM 5085 Lighted Program Function Keyboard (LPFK) Feature provides additional function keys. The LPFK Feature keys can be lighted individually by the software to indicate which keys are active. The function of each key is determined by the program using the LPFK.

The RT PC 5080 Peripheral Cable Kit is required to attach the LPFK Feature to the IBM 6151 System Unit. The cable from the Peripheral Cable Kit attaches to the end of the LPFK Feature cable. The Peripheral Cable Kit also includes a clamping device that encloses the connectors.

### Specifications

Number of keys	32
Power	From the adapter
Adapter	IBM 5080 Peripheral Adapter

---

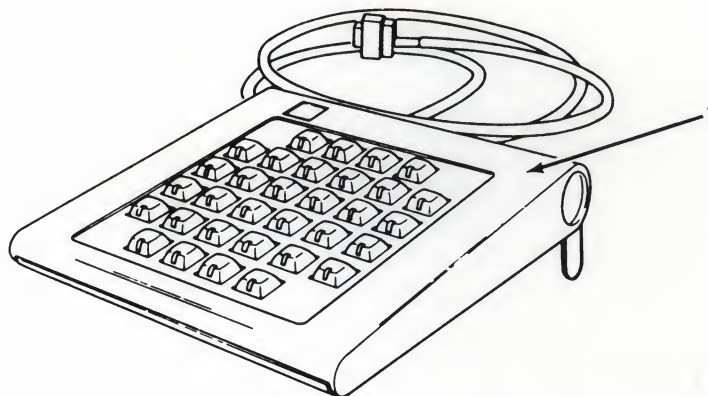
## Removal Procedure

1. Set the power switch on the system unit to Off.
2. Do the "Rear Cover Removal" on page 4-10.
3. Disconnect the cable to the IBM 5085 LPFK Feature from the RT PC 5080 Peripheral Adapter.
4. Remove the clamping device and disconnect the LPFK Feature Cable.

## Replacement Procedure

1. Connect the LPFK Feature cable connector to the cable from Peripheral Cable Kit and install the clamping device.
2. Connect the cable to the RT PC 5080 Peripheral Adapter.
3. Do the "Rear Cover Replacement" on page 4-11.
4. Set the power switch on the system unit to On.

## Parts Information



Index Number	Part Number	Description
1	6246799 6487563	IBM 5085 LPFK Feature RT PC 5080 Peripheral Cable





## **Section 11. Displays**

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---

## About this Section

This section contains information about the IBM Displays attached to the IBM 6151 System Unit. Use the contents list on the preceding page to find information about your display.

Pages in this section contain a 3-digit product code in the page number to make future updating easier.





## IBM 5081 Color Graphics Display

**Note:** The information in this publication is for Models 16 and 19 of the IBM 5081. If you have another model of the IBM 5081, see the Maintenance Information Manual for your model.

The IBM 5081 Color Graphics Display is the same display used on the IBM 5080 Graphics System.

Internal parts of the IBM 5081 Color Graphics Display are field replaceable. Refer to the Maintenance Information Manual that was shipped with your display, for part numbers, removal procedures, and replacement procedures.

## Specifications

Input voltage	Low voltage, 100 - 120 V ac High Voltage, 220 - 240 V ac
Input current	4.0 Amperes
Power frequency	60 Hz
Adapters	IBM Megapel Display Adapter

## Removal Procedure

Use the Attached Device Removal procedure in Section 4.

## Replacement Procedure

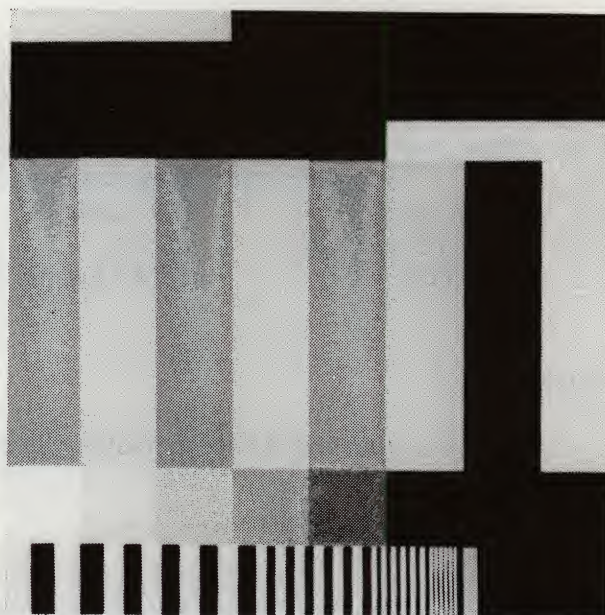
Use the Attached Device Replacement procedure in Section 4.

## Test Patterns

You will be directed when to use the following Test Patterns while running the Display Checkout program.

## | Combination Color Bar Pattern

Left to right, the color bars are green, yellow, red, magenta, blue, cyan, black, and white.

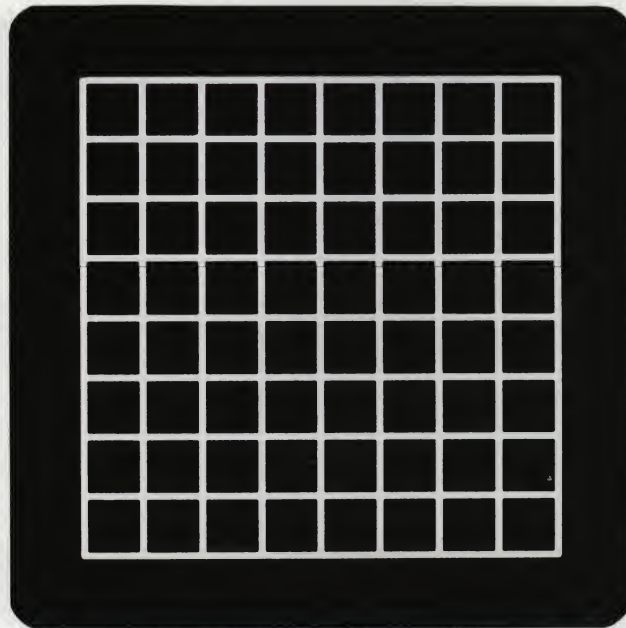


---

**Crosshatch or Grid Pattern**

This test pattern is used to check the convergence and the alignment on the IBM 5081. Use the alignment mask shipped with the IBM 5081 with this test pattern.

---





## | Flat Field Test Patterns

|                    The following types of Flat Field Test Patterns are available using the  
|                    Display Test procedure:

|                    White Flat Field    The red, blue, and green colors are at their full intensity  
|                    to check color purity.

|                    Black Flat Field    All colors are off.

|                    Red Flat Field    The red color is on at full intensity.

|                    Green Flat Field    The green color is on at full intensity.

|                    Blue Flat Field    The blue color is on at full intensity.

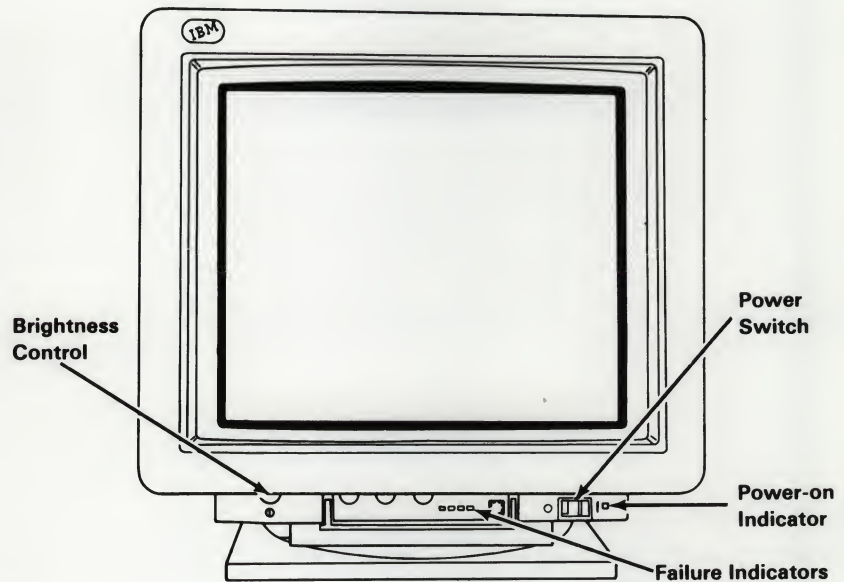
---





## Parts Information

For the part numbers and descriptions, see the Maintenance Information Manual that was shipped with the IBM 5081 Color Graphics Display.





---

## IBM 5151 Personal Computer Display

The IBM 5151 Personal Computer Display is the same display used on the IBM Personal Computer.

The internal parts of the display are not field replaceable.

### Specifications

Input voltage	Low voltage, 104 - 127 V ac High Voltage, 180 - 259 V ac
Power frequency	48 - 62 Hz
Adapters	IBM Monochrome Display and Printer Adapter and IBM PC Enhanced Graphics Adapter

### Removal and Replacement Procedures

Use the "Attached Device Removal" on page 4-22 procedure for removal.

Use the "Attached Device Replacement" on page 4-23 procedure for replacement.

## Test Patterns

**Use the following Test Patterns when you are running the display checkout program.**

## Test Pattern 1

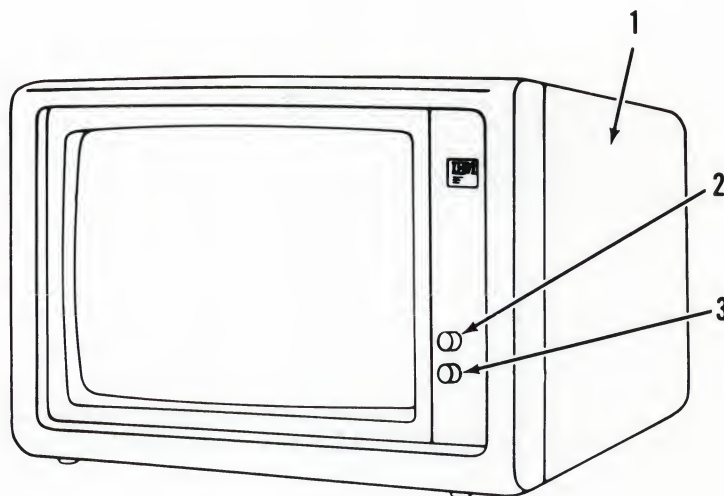
[illegible]

## Test Pattern 2

[illegible]



## Parts Information



Index Number	Part Number	Description
1	8529171	IBM 5151 display, low voltage
1	8529209	IBM 5151 display, high voltage
2	8529178	Contrast knob
3	8529177	Brightness knob
For "Restricted Availability Parts" see the next page.		

## Restricted Availability Parts

Index Number	Part Number	Description of the Restricted Availability Parts
	8529179	Logo/label kit, 120 V
	8654205	Logo/label kit, 220/240 V
		-Kits consist of: front and rear name plates, FCC label, caution label
	8529229	Front panel
	8529230	Back cover
	8529231	Upper cover plug
	8529232	Foot
	8529176	Power cord holder
	8529173	Signal cable
	8529235	Transformer, 120 V
	8654206	Transformer, 220/240 V
	8529237	Control support
	8529236	Transformer support
	8529175	Fuse, 0.75 Amp for 120 V
	8654204	Fuse, 0.50 Amp for 220/240 V
	8529233	Analog card
	8529234	PC card
	8529174	Power cord 120 V
	8654203	Power cord 220/240 V
	8529180	Misc. hardware kit
		-Kit consists of: CRT mounting screw, transformer screw, CRT mounting support, CRT bracket to front panel, transformer support to front panel, rubber bushing screw, rubber bushing nut, cable restraint screw, star washer

---

## IBM 5154 Enhanced Color Display

The IBM 5154 Enhanced Color Display can display up to 64 colors depending on the mode selected and the software used.

The display is a single field-replaceable unit.

### Specifications

Input voltage	Low voltage, 90 - 137 V ac High voltage, 180 - 259 V ac
Power frequency	48 - 62 Hz
Modes	Mode 1, 16 color - 15.75 kHz Mode 2, 64 color - 21.80 kHz
Vertical sync pulse	Mode 1, positive Mode 2, negative
Adapter	IBM PC Enhanced Graphics Adapter

### Removal and Replacement Procedures

Use the "Attached Device Removal" on page 4-22 procedure for removal.

Use the "Attached Device Replacement" on page 4-23 procedure for replacement.

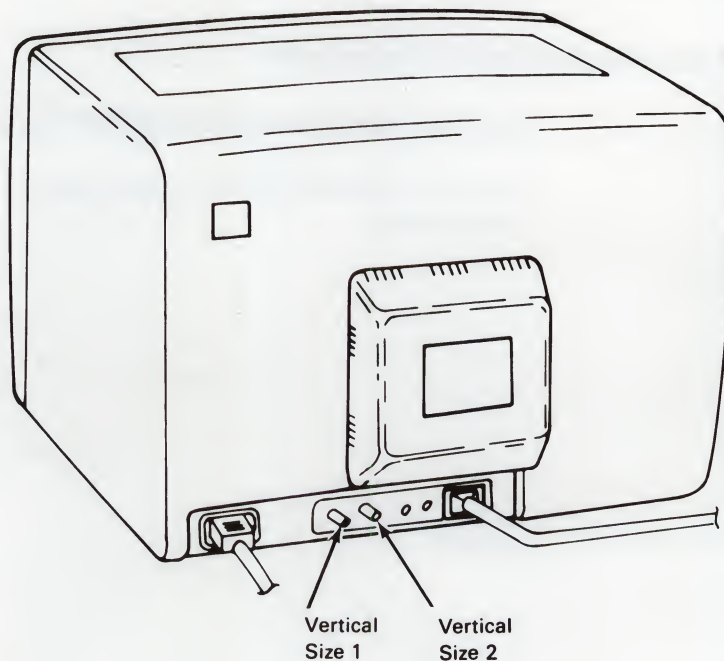
---

## Adjustments

The Adjustments are on the rear panel of the display. Use the following descriptions to set the controls.

### Vertical Size 1

1. Set the power switch on the system unit to Off.
2. Set the power switch on the display to On.
3. Turn the Brightness control fully clockwise.
4. Adjust the Vertical Size 1 control counterclockwise until a black area appears at the top and bottom of the screen. Then turn the control clockwise until the black areas disappear.
5. Set the Brightness control to the desired setting.

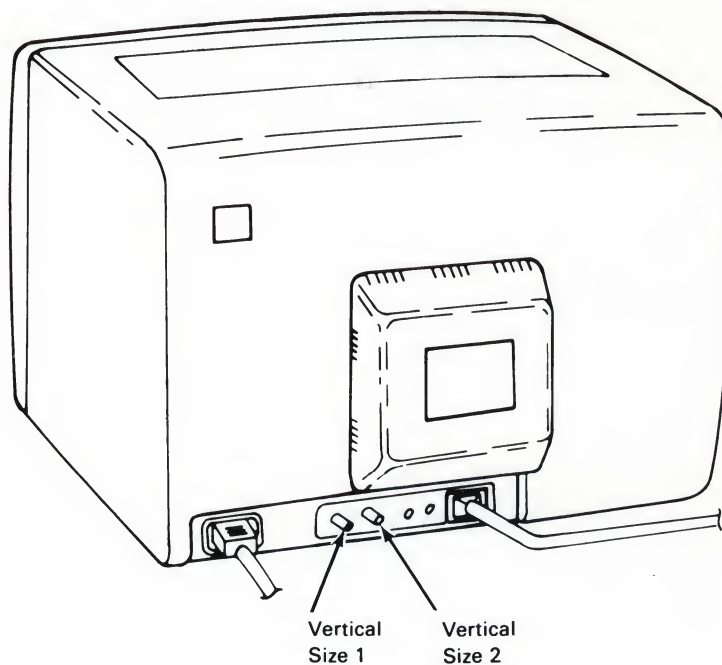




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## Vertical Size 2

1. Be sure the display is attached to an IBM PC Enhanced Graphics Adapter and the mode switches are set for enhanced mode. If needed, see Section 9.
  2. Set the power switch on the system unit and display to On.
  3. Turn the Brightness control fully clockwise.
  4. Adjust the Vertical Size 2 control until the black areas are equal on all sides, then return the Brightness control to the desired setting.
- 



## Test Patterns

Use the following Test Patterns when you are running the display checkout program.

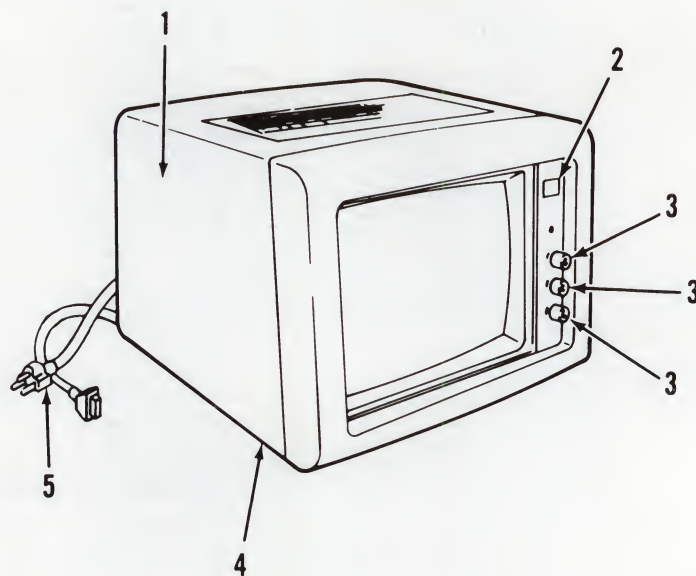
## Test Pattern 1

[illegible]

## Test Pattern 2

[illegible]

## Parts Information





Index Number	Part Number	Description
1	6321035	IBM 5154 display, Model 001, low voltage
1	6321049	IBM 5154 display, Model 002, high voltage, Northern Hemisphere
1	6321036	IBM 5154 display, Model 003, high voltage, Southern Hemisphere
2	6321061	Logo and label kit -Kit consists of: back logo, bottom cover warning labels (five languages)
3	6321056	Knob and cover cap kit -Kit consists of: on/off knob, contrast knob, brightness knob, cover cap (2), rear knob (2)
4	6323319	Rubber feet kit -Kit consists of: rubber feet (4), washers (4), screws (4)
5		Power cable, see Section 5
		For "Restricted Availability Parts" see the next page.

## Restricted Availability Parts

Index Number	Part Number	Description of the Restricted Availability Parts
	6321050	Front cover
	6321051	Rear cover
	6321052	Main PC board assembly, chassis, CRT drive card
	6321053	Power supply with cover
	6321054	Video amplifier assembly, RGB cable and connector
	6321055	Front control assembly
	6321057	Power-on indicator
	6321058	Rear control panel assembly, strain relief
	6321059	Signal cable
	6135903	Degaussing coil
	6321064	Miscellaneous hardware kit
		-Kit consists of: CRT rubber mounting washers (4), plastic drive board shield, plastic shield retainers (2), CRT and deflection yoke assembly with wires, ground band, CRT warning label
	6321060	Model 001, model 002
	6321063	Model 003

---

## IBM 6153 Advanced Monochrome Graphics Display

The IBM 6153 Advanced Monochrome Graphics Display displays black characters on a white background.

The display is a single field-replaceable unit.

The IBM 6153 display has a *raster test* position on the Brightness and Raster Test control. When the Brightness and Raster Test control is turned fully clockwise to the raster test position the display screen is lighted.

### Specifications

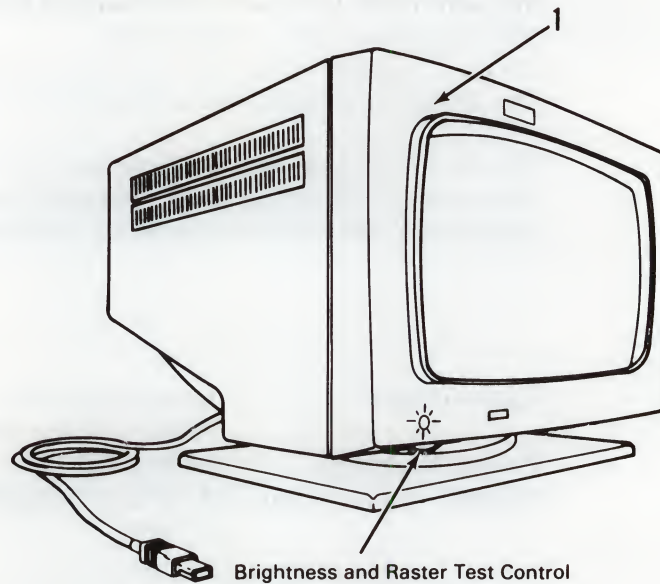
Input voltage	Low voltage, 90 - 137 V ac High Voltage, 180 - 259 V ac
Power frequency	48 - 62 Hz
Adapter	RT PC Advanced Monochrome Graphics Display Adapter

### Removal and Replacement Procedures

Use the "Attached Device Removal" on page 4-22 procedure for removal.

Use the "Attached Device Replacement" on page 4-23 procedure for replacement.

# Parts Information



Index Number	Part Number	Description
1	6299240	IBM 6153 display, low voltage
1	6299241	IBM 6153 display, high voltage



---

## IBM 6154 Advanced Color Display

The IBM 6154 Advanced Color Display is a color graphics display.

The internal parts of the display are not field replaceable.

### Specifications

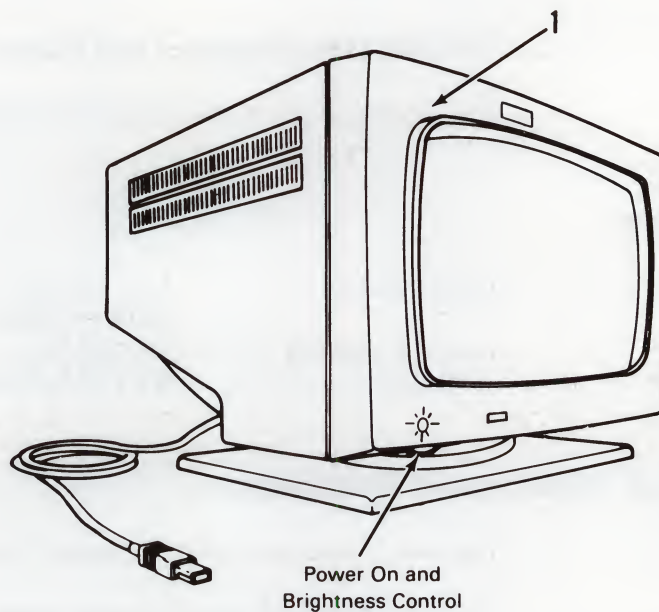
Input voltage	Low voltage, 90 - 137 V ac High Voltage, 190 - 259 V ac
Power frequency	48 - 62 Hz
Adapters	RT PC Advanced Color Display Adapter

### Removal and Replacement Procedures

Use the “Attached Device Removal” on page 4-22 procedure for removal.

Use the “Attached Device Replacement” on page 4-23 procedure for replacement.

## Parts Information



Index Number	Part Number	Description
1	6848113	IBM 6154 display, low voltage group 1
1	6848114	IBM 6154 display, low voltage group 2
1	6848115	IBM 6154 display, low voltage group 3
1	6848116	IBM 6154 display, high voltage group 1
1	6848117	IBM 6154 display, high voltage group 2
1	6848118	IBM 6154 display, high voltage group 3
1	6848119	IBM 6154 display, high voltage group 4
		Power cable, see Section 5.

---

## IBM 6155 Extended Monochrome Graphics Display

The IBM 6155 Extended Monochrome Graphics Display displays black characters on a white background.

The display is a single field-replaceable unit.

### Specifications

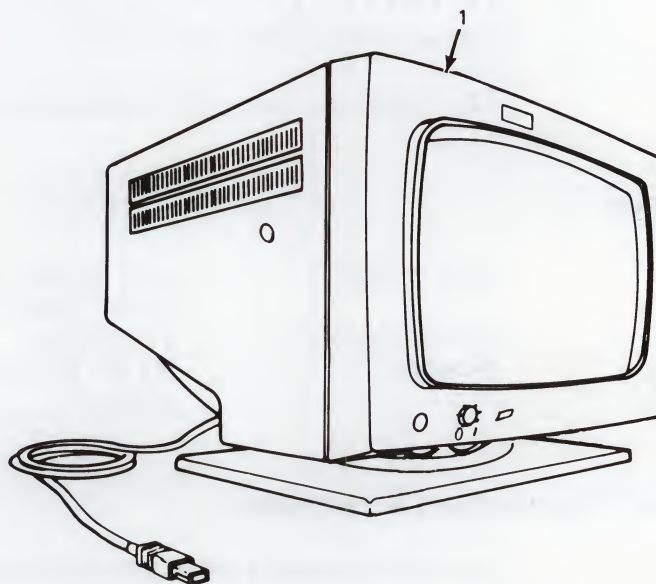
Input voltage	Low voltage, 90 - 137 V ac High Voltage, 180 - 259 V ac
Power frequency	48 - 62 Hz
Adapter	RT PC Extended Monochrome Graphics Display Adapter

### Removal and Replacement Procedures

Use the “Attached Device Removal” on page 4-22 procedure for removal.

Use the “Attached Device Replacement” on page 4-23 procedure for replacement.

## Parts Information



Index Number	Part Number	Description
1	6848215	IBM 6155 display, low voltage
1	6848216	IBM 6155 display, high voltage
		Power cable, see Section 5.



---

## **Section 12. Tape Drive**



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## CONTENTS (9/86)

About this Section .....	12-3
IBM 6157 Streaming Tape Drive .....	12-170-1
Specifications .....	12-170-1
Removal and Replacement Procedures .....	12-170-1
Tape Cartridge .....	12-170-2
Parts Information .....	12-170-3

---

## About this Section

This section contains information about the IBM tape drive used by the IBM 6151 System Unit.

Pages in this section contain a 3-digit product code in the page number to make future updating easier.





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## IBM 6157 Streaming Tape Drive

The IBM 6157 Streaming Tape Drive uses a 1/4-inch tape cartridge. The tape drive contains a power supply and plugs into an outlet.

The tape drive is a single field-replaceable unit.

See *IBM RT PC Streaming Tape Drive Setup and Operating Instructions* for the head cleaning procedure.

### Specifications

Tape cartridges	3M DC300XLP, DEI 400442, DEI 402555, or an equivalent cartridge
Input voltage	U.S., 90 - 137 V ac WT low voltage, 90 - 137 V ac WT high voltage, 180 - 259 V ac
Maximum number Adapter	1 RT PC Streaming Tape Drive Adapter

### Removal and Replacement Procedures

Use the "Attached Device Removal" on page 4-22 procedure for removal.

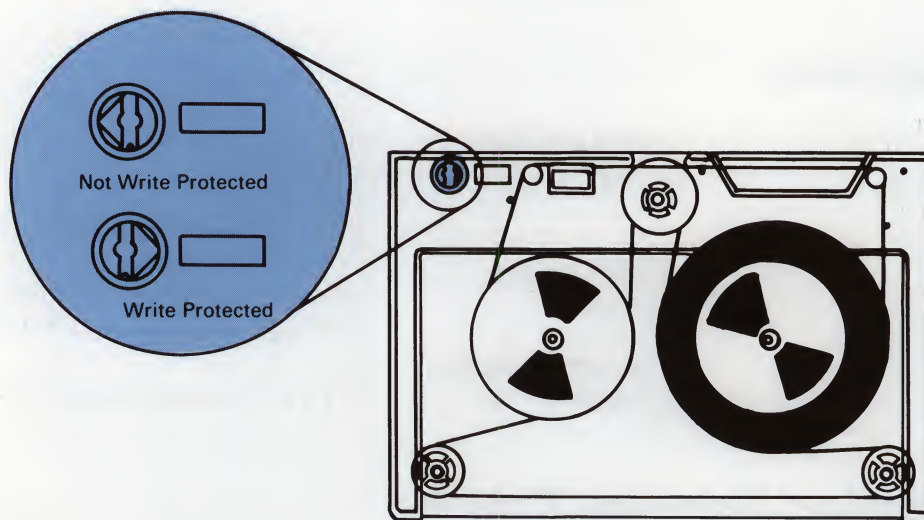
Use the "Attached Device Replacement" on page 4-23 procedure for replacement.

---

## Tape Cartridge

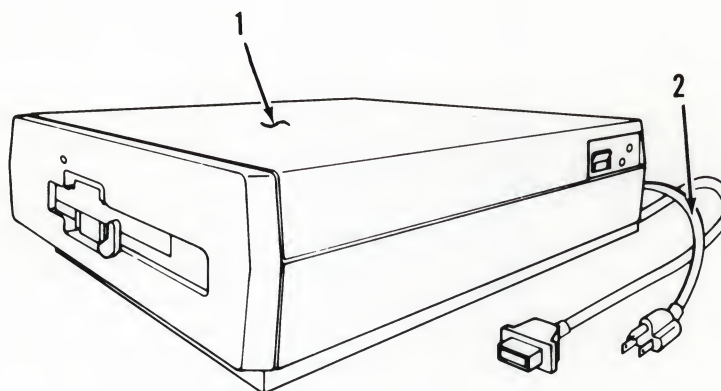
The tape cartridge shown is typical. The write protect switch positions are shown.

---



---

## Parts Information



Index Number	Part Number	Description
1	6299237	IBM 6157 tape drive, U.S., WT low voltage
1	6298375	IBM 6157 tape drive, WT high voltage
2		Power cable, see Section 5
		For "Restricted Availability Parts" see the next page.

---

## Restricted Availability Parts

Index Number	Part Number	Description of the Restricted Availability Parts
	6453920	WT power supply
	6453921	WT power filter
	6453922	WT signal cable
	6453975	WT fan, low voltage
	6453923	WT fan, high voltage
	6453924	WT top cover
	6453925	WT base
	6453926	WT rear cover
	6453927	WT front bezel
	6453928	WT switch bezel
	6453929	WT lock lever kit
	6453930	WT cork feet
	6453931	WT tray
	6453932	WT power switch
	6453933	WT drive
	61X6836	WT cable, ac
	61X6837	WT cable, dc
	61X6838	WT cork pads
	61X6839	WT cover, power switch
	61X6840	WT standoff, short
	61X6841	WT standoff, long
	61X6842	WT screw, fan mounting
	61X6843	WT cover, torroid
	61X6844	WT plate, power supply
	61X6845	WT clamp, signal cable
		-List continues on the next page



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**Restricted Availability Parts (continued)**

<b>Index Number</b>	<b>Part Number</b>	<b>Description of the Restricted Availability Parts</b>
	61X6846	WT strain relief
	61X6847	WT cable tie
	61X6848	WT cable tie (0.625 inch)
	61X6849	WT cable tie (1.25 inch)
	61X6850	WT plate, low voltage U.S.
	61X6851	WT plate, low voltage Singapore
	61X6852	WT plate, high voltage U.S.
	61X6853	WT plate, high voltage Singapore
	61X6854	WT caution label
	61X6855	WT cable shell
	61X6856	WT thumb screw



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## Appendix A. Tool Requirements

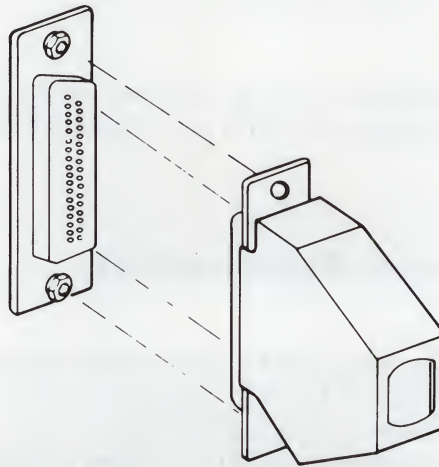
This appendix contains the descriptions and part numbers for special tools used to service the IBM 6151 System Unit.

### Wrap Plugs for the Service Representative

The wrap plugs used by the service representative are stored in the back of this manual. The wrap plugs used by the customer are stored in the back of the *Problem Determination Guide*. You are directed by the diagnostic program when to install or remove a wrap plug.

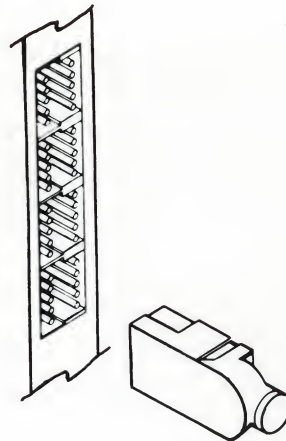
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The Printer Adapter Wrap Plug (Part Number 8259228) is not shipped with this manual or the *Problem Determination Guide*. This is the same wrap plug used with the IBM Personal Computer.

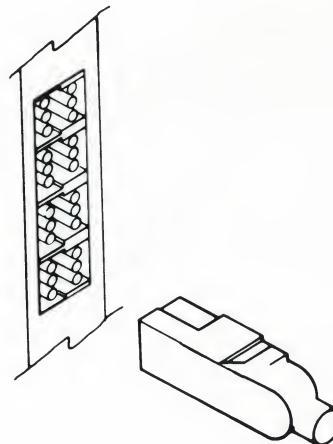


**Printer Adapter Wrap Plug (Part Number 8529228)**

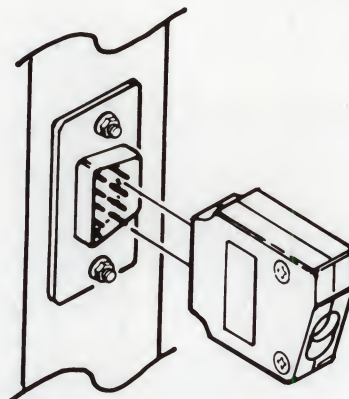




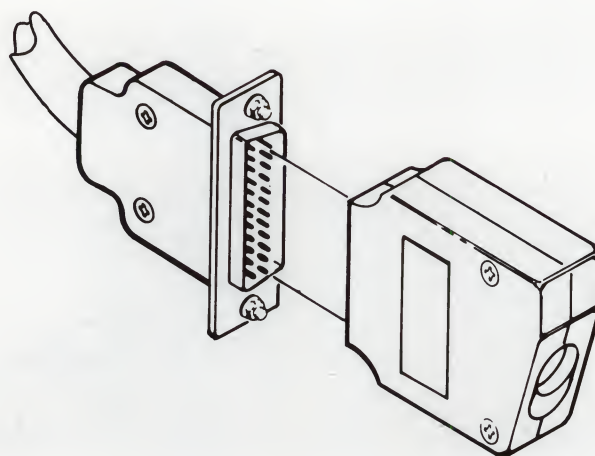
**4-Port Asynchronous RS232C Adapter Wrap Plug (Part Number 6298966)**



**4-Port Asynchronous RS422 Adapter Wrap Plug (Part Number 6298967)**



**Serial Port Wrap Plug, 9-pin (Part Number 6298965)**

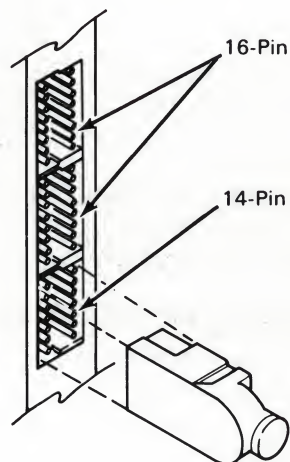


**Serial Port Cable Wrap Plug, 25-pin (Part Number 6298964)**

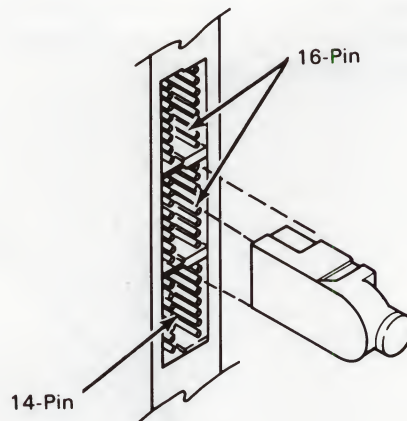
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## Wrap Plugs for the Customer

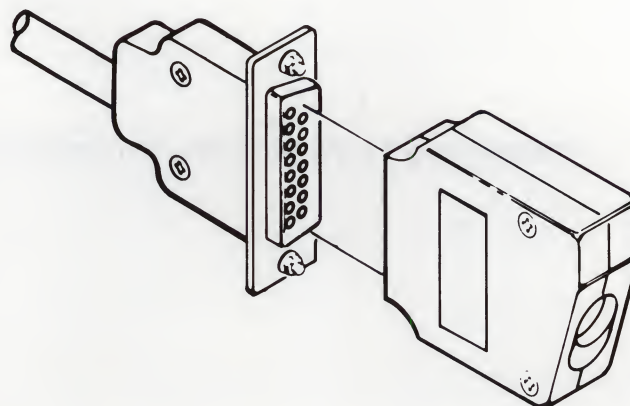
The wrap plugs used by the customer are stored in the back of the *Problem Determination Guide*. You are directed by the diagnostic program when to install or remove a wrap plug.



**Multiprotocol 14-Pin Wrap Plug (Part Number 6487608)**

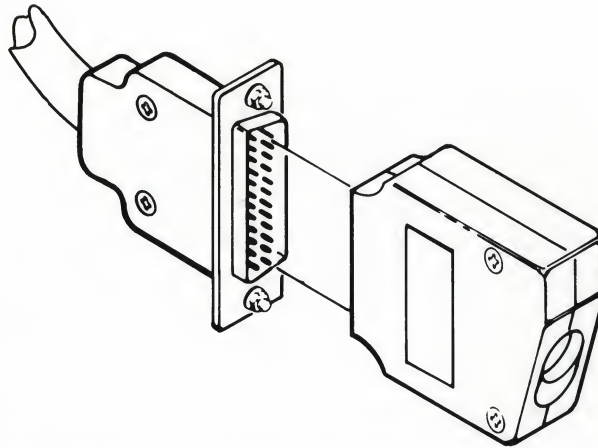


**Multiprotocol 16-Pin Wrap Plug (Part Number 6487609)**

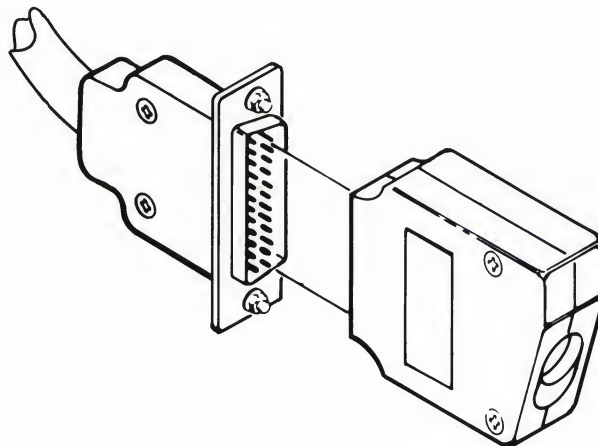


**Multiprotocol X.21 15-Pin Cable Wrap Plug (Part Number 6487605)**

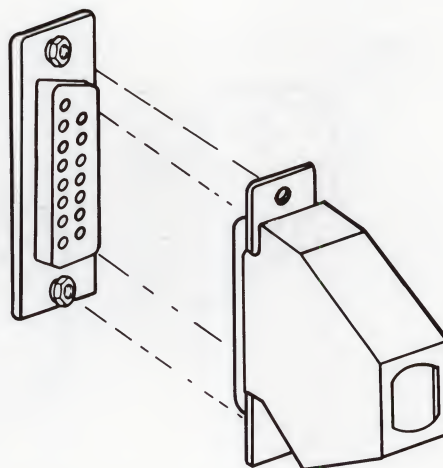




**Multiprotocol RS-232 Cable Wrap Plug (Part Number 6487606)**



**Multiprotocol RS-366 Cable Wrap Plug (Part Number 6487607)**

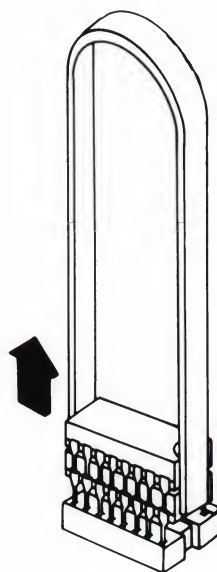


**Baseband Adapter Wrap Plug (Part Number 6299189)**

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## Module Puller

To remove a module, grasp the module with the module puller and gently lift one end and then the other, to avoid bending the pins.



**Module Puller (Part Number 9900764)**

## Multimeter

A multimeter is used to measure resistance during the safety check. Use your normal multimeter for this check.





## Appendix B. SRA to FRU Cross-Reference List

This appendix contains a list of the Service Repair Action (SRA) numbers used on the IBM 6150 and IBM 6151 System Units. Use this list to determine the FRU part number or service action each SRA number represents.

SRA Number	Part Number	Description
10x	6299232	System board (IBM 6150)
10x	60X5712	System board, WT (IBM 6150)
10x	6299231	System board (IBM 6151)
12x	6848223	1MB Memory Expansion Option
15x	6299228	2MB Memory Expansion Option
16x	61X6157	4MB Memory Expansion Option
19x	6299220	RT PC Floating-Point Accelerator
1Cx	61X6814	RT PC Advanced Floating-Point Accelerator
1Dx	61X7005	4MB Fast Memory Expansion Option
1Ex	61X7009	8MB Fast Memory Expansion Option
20x	6299226	RT PC AT Coprocessor Option
21x	8286115	AT 512 KB Memory Expansion Option
22x		I/O memory error. Check for nonsupported memory.
23x	8286147	AT Serial/Parallel Adapter
24x	8286127	AT Math Co-Processor module
26x		I/O memory error. Check for nonsupported memory.
28x	6299350	Multiprotocol Adapter
2Bx	6299232	System board (IBM 6150)
2Bx	60X5712	System board, WT (IBM 6150)
2Bx	6299231	System board (IBM 6151)
2Cx	6299232	System board (IBM 6150)

SRA Number	Part Number	Description
2Cx	60X5712	System board, WT (IBM 6150)
2Cx	6299231	System board (IBM 6151)
30x	69X8142	IBM Token-Ring Network RT PC Adapter
31x	8286171	IBM PC Network Adapter
32x	6247851	RT PC 5080 Attachment Adapter
34x	8665792	3278/79 Emulation Adapter
35x	61X6339	4-Port Asynchronous RS-232C Adapter
36x		I/O memory error. Check for nonsupported memory.
37x	8286139	AT 512 KB Memory Expansion Option module
38x	6487562	RT PC 5080 Peripheral Adapter
39x	79X3782	4-Port Asynchronous RS-422A Adapter
3Ax	6247891	IBM S/370 Host Interface Adapter
40x	61X6809	Baseband Adapter
41x	8654215	Enhanced Graphics Adapter
42x	6323468	Graphics Memory Expansion Card
43x	6299223	Advanced Monochrome Graphics Display Adapter
44x	8654219	Graphics Memory Module (1 each)
45x	6299392	Advanced Color Graphics Display Adapter
47x	6299351	Extended Monochrome Graphics Display Adapter
49x	8529148	IBM Monochrome Display and Printer Adapter
4Ax	6247662	IBM Megapel display processor board
4Bx	6247666	IBM Megapel display controller board
52x	79X3431	AT Fixed-Disk and Diskette Drive Adapter
53x	6299201	Battery
54x	8529171	IBM 5151 Display, low voltage
54x	8529209	IBM 5151 Display, high voltage
58x	6321035	IBM 5154 Display, Model 001, low voltage
58x	6321049	IBM 5154 Display, Model 002, high voltage, Northern Hemisphere
58x	6321036	IBM 5154 Display, Model 003, high voltage, Southern Hemisphere
59x	6848113	IBM 6154 Display, low voltage group 1
59x	6848114	IBM 6154 Display, low voltage group 2



SRA Number	Part Number	Description
59x	6848115	IBM 6154 Display, low voltage group 3
59x	6848116	IBM 6154 Display, high voltage group 1
59x	6848117	IBM 6154 Display, high voltage group 2
59x	6848118	IBM 6154 Display, high voltage group 3
59x	6848119	IBM 6154 Display, high voltage group 4
5Bx	61X7001	RT PC SCSI Adapter
5Cx	0855253	RT PC SCSI Adapter Fuse (1A 250V)
60x	6299240	IBM 6153 Display, low voltage
60x	6299241	IBM 6153 Display, high voltage
61x		IBM 5081 Display, low voltage
61x		IBM 5081 Display, high voltage
62x	6848215	IBM 6155 Display, low voltage
62x	6848216	IBM 6155 Display, high voltage
63x	6453886	Operator panel board
64x	8286130	AT High Capacity Diskette Drive
64x	68X3752	AT High Capacity Diskette Drive, WT
66x	8286131	AT Dual-Sided Diskette Drive (IBM 6150)
66x	68X3753	AT Dual-Sided Diskette Drive, WT (IBM 6150)
70x	61X6942	Fixed-Disk Drive Type R70
74x	6299235	Fixed-Disk Drive Type R40
77x	79X3989	Fixed-Disk Drive Type E70
78x	6299238	Keyboard, United States English
78x	6299315	Keyboard, United Kingdom English
78x	6299316	Keyboard, French
78x	6299317	Keyboard, German
78x	6299318	Keyboard, Spanish
78x	6299319	Keyboard, Italian
78x	6487676	Keyboard, Portuguese
78x	6487677	Keyboard, Danish
78x	6487678	Keyboard, Norwegian
78x	6487679	Keyboard, Finnish/Swedish
78x	6487680	Keyboard, Belgian-French/Dutch
78x	6487681	Keyboard, Swiss German/French

SRA Number	Part Number	Description
78x	6487682	Keyboard, Canadian-French
79x	6299239	Mouse
7Ax	6248436	IBM 5085 Dials Feature
7Bx	6246799	IBM 5085 LPFK Feature
7Cx	6248522	Stylus for Models 11, 11A, 12, 12A
7Dx	6248523	Cursor for Models 11, 11A, 12, 12A
7Ex	6248514	IBM 5083 Model 11 Tablet
7Ex	6248516	IBM 5083 Model 11A Tablet
7Ex	6248524	Cable, IBM 5083 to RT PC
80x	6248513	IBM 5083 Model 12 Tablet
80x	6248515	IBM 5083 Model 12A Tablet
80x	6248524	Cable, IBM 5083 to RT PC
81x	6299237	IBM 6157 tape drive, U.S., WT low voltage
81x	6298375	IBM 6157 tape drive, WT high voltage
82x	61X6351	ESDI Magnetic Media Adapter
84x	79X3766	Processor board
85x	6299222	Streaming Tape Drive Adapter
86x	6848231	Extended ESDI Magnetic Media Adapter
87x	6299485	Keylock
88x	6080446	Power supply, U.S. low voltage (IBM 6150)
88x	6080447	Power supply, WT low voltage (IBM 6150)
88x	6080448	Power supply, WT high voltage (IBM 6150)
88x	6298452	Power supply, U.S. (IBM 6151)
88x	6298454	Power supply, WT low voltage (IBM 6151)
88x	6298453	Power supply, WT high voltage (IBM 6151)
88x	6952300	Power cable, U.S., Venezuela, Canada, Japan, Saudi Arabia
88x	6952301	Power cable, Cook County, Illinois
88x	6952311	Power cable, Australia, New Zealand, Argentina
88x	6952320	Power cable, Northern Europe, Greece, Turkey
88x	6942347	Power cable, South Africa
88x	6952356	Power cable, U.K., Ireland, Hong Kong, Singapore
88x	6952365	Power cable, Switzerland



<b>SRA Number</b>	<b>Part Number</b>	<b>Description</b>
88x	6952374	Power cable, Italy, Chile
88x	6942383	Power cable, Israel
88x	1838574	Power cable, Thailand
8Ax	6248427	Stylus for Model 1
8Bx	6248428	Cursor for Model 1
8Cx	6248426	IBM 5083 Model 1 Tablet
8Dx		Network problem
8Ex	08F3639	Advanced Processor board
8Fx		SCSI bus problem
91x		Attached device
95x	8286173	IBM PC Network Translator
95x	8286174	Connection hardware
95x	8286176	Power transformer, U.S.
95x	8286177	Power transformer, WT
981		POST Error 03 or 05
982		POST Error 00 or 04
983		POST Error 11 or 12
984		POST Error 23
985		Invalid display data
986		Undetermined problem
987		POST Error 5c
989		Missing Option
98A		Format fixed disk
98B		Compatability problem
991		Obvious problem
A1x	61X6937	Cable, drive positions A - D (IBM 6150)
A1x	6298359	Power distribution cable (IBM 6150)
A1x	61X6800	Cable, fixed-disk and diskette drive (IBM 6151)
A2x	61X6938	Cable, drive position E (IBM 6150)
A5x		External power cable (from error log entry)
A6x	8286182	Cable, PC Network 7.62m (25 foot)
A6x	8286172	Adapter, PC Network Cable
A6x	8286183	Cable, PC Network 15.24m (50 foot)

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A6x	8286184	Cable, PC Network 30.48m (100 foot)
A6x	8286185	Cable, PC Network 60.96m (200 foot)
A7x	6298240	RT PC Modem Cable – RS-232C (10 Pin)
A8x	8286170	AT Modem Cable – RS232C/9 Pin
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B2x	8529214	IBM PC Parallel Printer Cable
B3x	6298963	RT PC Serial Printer Cable (9 Pin)
B4x	6298526	RT PC ASCII Terminal Cable – RS-232C (10 Pin)
B4x	79X3914	RT PC ASCII Terminal Cable RS-232C (10/25M-Pin)
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FCx		Unidentified diskette drive





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## Appendix C. Error Log Information

This appendix provides a brief overview of the **Error Log** and the associated commands used by the AIX<sup>1</sup> Operating System. Additional information and detailed descriptions are provided in the *AIX Operating System Commands Reference* manual and the software problem determination part of the *Problem Determination Guide*.

The Error Log Information is useful in determining the failing area of the system unit or the software. Where possible, both intermittent and permanent failures are recorded in the Error Log. Intermittent failures of the hardware and software may not be detected by the diagnostic programs.

The **errdemon** command is used to start logging error data in the Error Log.

The **errstop** command is used to stop the logging of error data in the Error Log.

The **errpt** command is used by the AIX Operating System to read the data in the Error Log and display or print a report from that data.

The following pages briefly describe the commands and the reports they produce. See Error Log Command Examples in this appendix for examples of commands.

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<sup>1</sup> Trademark of IBM

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## Error Log Reports

There are two basic types of Error Log Reports. They are the *Summary Report* and the *Detail Report*.

### Summary Report

The Summary Report is the default report of the **errpt** command. The Summary Report provides one-line descriptions of each error record or information record stored in the Error Log. The Summary Report can be limited to specific data such as; permanent errors or hardware errors. Examples of the commands to produce these reports are given under Error Log Command Examples in this appendix.

The following information is provided in a Summary Report:

<b>Date/Time</b>	Provides the date and time the entry was logged.
<b>Class</b>	Provides the class of the error such as; hardware or software.
<b>Subclass</b>	Provides additional information about the error class such as; the device or component that caused the error.
<b>Type</b>	Provides information about the severity of the error such as; permanent, or temporary.
<b>Device</b>	For hardware errors the device is identified, if possible.
<b>Cause</b>	If the cause for the error can be determined, the cause is listed here.

---

## Detail Report

The Detail Report provides detail information on each error recorded in the Error Log. In addition to the information provided on the Summary Report, the Detail Report provides the following hardware service related information.

<b>Service Request Number</b>	Provides the Service Request Number (SRN) for the error. This number has from one to four Service Repair Action (SRA) numbers in it. Each SRA corresponds to a FRU. The SRA numbers are listed in the most to least likely failure order.
<b>Probable Cause</b>	Provides a description of the most likely cause of the failure.
<b>User Action</b>	Lists actions that the user can do to help isolate the failure.



---

## The Error Report Command

The AIX Operating System recognizes the **errpt** command to display or print an error report. The **errpt** command is entered when the **#** or **\$** prompt is displayed by the AIX Operating System.

The **errpt** command has several extensions to define the type report you want, type errors included, time period, and other limits on the data included.

The extensions described here are for service related information. If you need more information, see Error Log Command Examples in this appendix or see the *AIX Operating System Commands Reference* manual.

Use the following format and explanations as an example.

**errpt ff ff ccc,ttt ffMMddhhmmyy ffMMddhhmmyy | dddd**

**ff** The flags are used to select the type report and the limits desired.

- a** Produces a detail report.
- d** Limits the report to a certain class (**ccc**) and type (**ttt**) of error. Separate the class and type with a comma.
- e** Include entries with earlier date and time.
- n** Include only entries from a specific node.
- s** Include entries with later date and time.

**ccc** The class of errors included in the report.

- h00** All hardware errors. These errors are normally caused by the hardware or media.
- s00** All software errors. These errors are normally caused by the software programs.
- i00** All IPL/shutdown errors. These are not errors but provide data on the date and time a shutdown or IPL occurred.



---

**ttt**

The type errors included in the report.

- t01** All permanent errors. Permanent errors are errors that occur each time the operation is attempted.
- t02** All temporary errors. Temporary errors are errors that do not prevent an operation from completing.
- t03** Information only. Information entries in the error log provide data about an event.
- t04** Counters. Counter errors are transient errors that exceed the threshold count for that error.

**MMddhhmmyy** Sets the date and time limits to be included in the error report. This allows you to print only errors that occurred before or after a certain date and time. See Error Log Command Examples for the use of this parameter.

**MM** Month  
**dd** Day  
**hh** Hour  
**mm** Minute  
**yy** Year

**dddd**

Specifies the device to print or display the report on.

- pg** Display the selected report one page at a time. Press the **Enter** key to display the next page. An EOF is displayed at the end of the report. Press the **Enter** key to return to the AIX Operating System.
- print** Print the selected report. The report prints on the printer assigned as the default printer for the AIX Operating System.

---

## Error Log Command Examples

The following Error Log Command Examples illustrate some of the common reports. For details see the *AIX Operating System Commands Reference* manual. All commands can be issued when the # prompt is displayed.

The following example turns the Error Log On.

```
/usr/lib/errdemon
```

The following example turns the Error Log Off.

```
errstop
```

The following example displays a summary report of the complete error log, one page at a time.

```
errpt | pg
```

The following example prints a summary report of the complete error log.

```
errpt | print
```

The following example prints a detailed report of the permanent hardware errors that occurred between 10:05 AM June 1, 1985 and 2:25 PM June 3, 1985.

```
errpt -a -d h00,t01 -s0601100585 -e0603142585 | print
```

---

The following example displays a summary report of all the software errors in the error log, one page at a time.

```
errpt -d s00 | pg
```

The following examples delete the error log files.

```
rm -f /usr/adm/ras/errfile.0
```

```
rm -f /usr/adm/ras/errfile.1
```





---

## Glossary

**A.** Ampere.

**ac.** Alternating current.

**adapter.** A device for connecting two parts that differ.

**alternating current (ac).** A current that periodically reverses its direction of flow.

**American National Standard Code for Information Exchange (ASCII).** The standard code, using a coded character set consisting of 7-bit coded characters (8 bits including parity check), used for information exchange between data processing systems, data communication systems, and associated equipment. The ASCII set consists of control characters and graphic characters.

**ampere (A).** A unit of measure for electric current.

**ASCII.** American National Standard Code for Information Exchange.

**asynchronous transmission.** In data communications, a method of transmission in which the bits included in a character, or block of characters, occur during a specific time interval. However, the start of each character or block of characters can occur at any time during this interval. Contrast with *synchronous transmission*.

**BIOS.** Basic Input/Output System

**bits per second (bps).** A unit of measurement representing the number of discrete binary digits transmitted by a device in one second.

**bps.** Bits per second.

**British thermal units (BTU).** A standard unit of measurement of heat.

**BTU.** British thermal units.

**byte.** (1) A sequence of eight adjacent binary digits that are operated on as a unit. (2) A binary character operated on as a unit. (3) The representation of a character.

**C.** Celsius.

**Celsius (C).** A temperature scale. Contrast with Fahrenheit (F).

**characters per second (cps).** A standard unit of measurement for the speed at which a printer prints.

**computer.** A functional unit that can do substantial computation, including many arithmetic operations or logic operations, without intervention by a human operator during a run.

**configuration.** (1) The arrangement of a computer system or network as defined by the nature, number, and the chief characteristics of its functional units. More specifically, the term configuration may refer to a hardware configuration or a software configuration. (2) The devices and programs that make up a system, subsystem, or network.

**cps.** Characters per second.

**cursor.** (1) A movable symbol (such as an underline) on a display, used to indicate to the operator where the next typed character will be placed or where the next action will be directed. (2) A marker that indicates the current data access location within a file.

**data.** (1) A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by human or automatic means. (2) Any representations, such as characters or analog quantities, to which meaning is, or might be assigned.

**direct memory access (DMA).** A method of transferring data between main storage and I/O devices that does not require processor intervention.

**disk drive.** The same as fixed disk drive.

**diskette.** A thin, flexible magnetic plate that is permanently sealed in a protective cover. It can be used to store information copies from the disk or another diskette.

**diskette drive.** A mechanism used to read and write information on diskettes.

**display.** (1) A device for visual presentation of information. (2) To present data visually.

**DMA.** Direct memory access.

**duplex.** Pertains to communications data that can be sent and received at the same time. Same as *full duplex*.

**ECC.** Error checking and correction.

**error-checking and correction (ECC).** The detection, in the processing unit, and correction of all single-bit errors, plus the detection of double-bit and some multiple-bit errors.

**F.** Fahrenheit.

**Fahrenheit (F).** A temperature scale. Contrast with Celsius (C).

**FCC.** Federal Communications Commission.

**field-replaceable unit (FRU).** Parts or devices that can be replaced during the normal servicing of the equipment.

**fixed-disk drive.** A mechanism used to read and write information on fixed disk.

**format.** (1) A defined arrangement of such things as characters, fields, and lines, usually used for displays, printouts, or files. (2) The pattern which determines how data is recorded.

**FRU.** Field-replaceable unit.

**hardware.** The equipment, as opposed to the programming, of a computer system.



---

**hertz (Hz).** A unit of frequency equal to one cycle per second.

**Hz.** Hertz.

**initial program load (IPL).** The process of loading the system programs to prepare the system to run jobs. See *initialize*.

**initialize.** To set counters, switches, addresses, or contents of storage to 0 or other starting values at the beginning of, or at prescribed points in, the operation of a computer routine.

**input/output (I/O) device.** A device in a data processing system by which data may be entered into the system, received from the system, or both.

**interrupt.** (1) To temporarily stop a process. (2) In data communications, to take an action at a receiving station that causes the sending station to end a transmission. (3) A signal sent by an I/O device to the processor when an error has occurred or when assistance is needed to complete I/O. An interrupt usually suspends execution of the currently executing program.

**IPL.** initial program load.

**I/O.** Input/output.

**k.** Prefix kilo; 1000.

**K.** When referring to storage capacity; 1024.

**m.** Meter.

**M.** When referring to computer storage capacity, 1 048 576.

**memory.** Storage on electronic chips. Examples of memory are random access memory, read only memory, or registers. See *storage*.

**modem (modulator-demodulator).** A device that converts data from a computer to a signal that can be transmitted on a communications line, and converts the signal received to data for the computer.

**operating system.** Software that controls the execution of programs; an operating system may provide services such as resource allocation, scheduling, input/output control, and data management.

**PEL.** Picture element.

**picture element (PEL).** The smallest displayable unit on a display.

**port.** (1) To make the programming changes necessary to allow a program that runs on one type of computer to run on another type of computer. (2) An access point for data input to or data output from a computer system.

**POST.** power-on self-test.

**power-on self-test (POST).** Tests that run first after initial power on to test the operation of the system.

**power supply.** A device that produces the power needed to operate electronic equipment.

**processor.** (1) In a computer, a functional unit that interprets and executes instructions. (2) A functional unit, a part of another unit such as a

terminal or a processing unit, that interprets and executes instructions.

**program.** A file containing a set of instructions conforming to a particular programming language syntax.

**radio frequency (RF).** An ac frequency that is higher than the highest audio frequency. So called because of the application to radio communication.

**RAM.** Random access memory. Read/write memory.

**random access memory (RAM).** Read/write memory.

**raster.** A predetermined pattern of lines that provides uniform coverage of a display space.

**read.** To acquire or interpret data from a storage device, from a data medium, or from another source.

**read-only memory (ROM).** A storage device whose contents cannot be modified. The memory is retained when power is removed.

**read/write memory.** A storage device whose contents can be modified. Also called RAM.

**resident.** Permanently located in memory, such as read-only memory.

**ROM.** Read-only memory.

**RS232C.** A standard by the EIA for communication between computers and external equipment.

**setup.** (1) In a computer that consists of an assembly of individual computing units, the arrangement of interconnections between the units, and the adjustments needed for the computer to operate. (2) The preparation of a computing system to perform a job or job step. Setup is usually performed by an operator and often involves performing routine functions, such as mounting tape reels. (3) The preparation of the system for normal operation.

**software.** (1) Computer programs, procedures, and rules concerned with the operation of a data processing system. (2) Contrast with hardware.

**source number.** The two leftmost digits of a service request number. Identifies the entity that sensed the error.

**SRA number.** Service repair action number.

**SRN.** Service request number.

**storage.** (1) The location of saved information. (2) In contrast to memory, the saving of information on physical devices such as disk or tape. See *memory*. (3) The retention of data in a storage device. (4) The placement of data into a storage device.

**synchronous transmission.** (1) Data transmission which the time of occurrence of each signal representing a bit is related to a fixed time frame. (2) Data transmission which the sending and receiving devices are operating continuously at substantially the same frequency and are maintained, through correction, in a desired phase relationship.



---

**TD. Transmit data.**

**transmission.** (1) The sending of data from one place for reception elsewhere. (2) In ASCII and data communication, a series of characters including headings and text. (3) The dispatching of a signal, message, or other form of intelligence by wire, radio, telephone, or other means. (4) One or more blocks or messages. For BSC and start-stop devices, a transmission is terminated by an EOT character. (5) Synonymous with data transmission.

**V. Volt.**

**volt.** The basic practical unit of electric pressure. The potential that causes electrons to flow through a circuit.

**W. Watt.**

**watt.** The practical unit of electric power.

**write.** To make a permanent or transient recording of data in a storage device or on a data medium.



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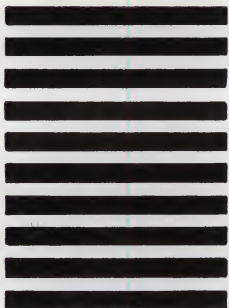
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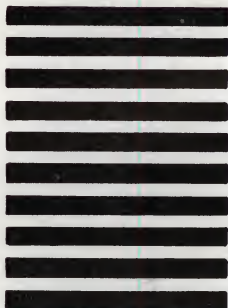
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# **IBM TECHNICAL NEWSLETTER**

for the

## **IBM RT PC 6150 and 6151 System Unit**

### **Hardware Maintenance and Service Manuals**

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—OVER—

SN32-9004-00



**SN32-9004**

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## Summary of Changes

This change provides updated pages to TNL SN20-9850 dated May 1987.

**Important:** Be sure that TNL SN20-9850 is installed before changing the pages. To determine if the TNL is installed, look at the TNL number at the top of page 3-0060-1. If the TNL is not installed, do not change the following pages.

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